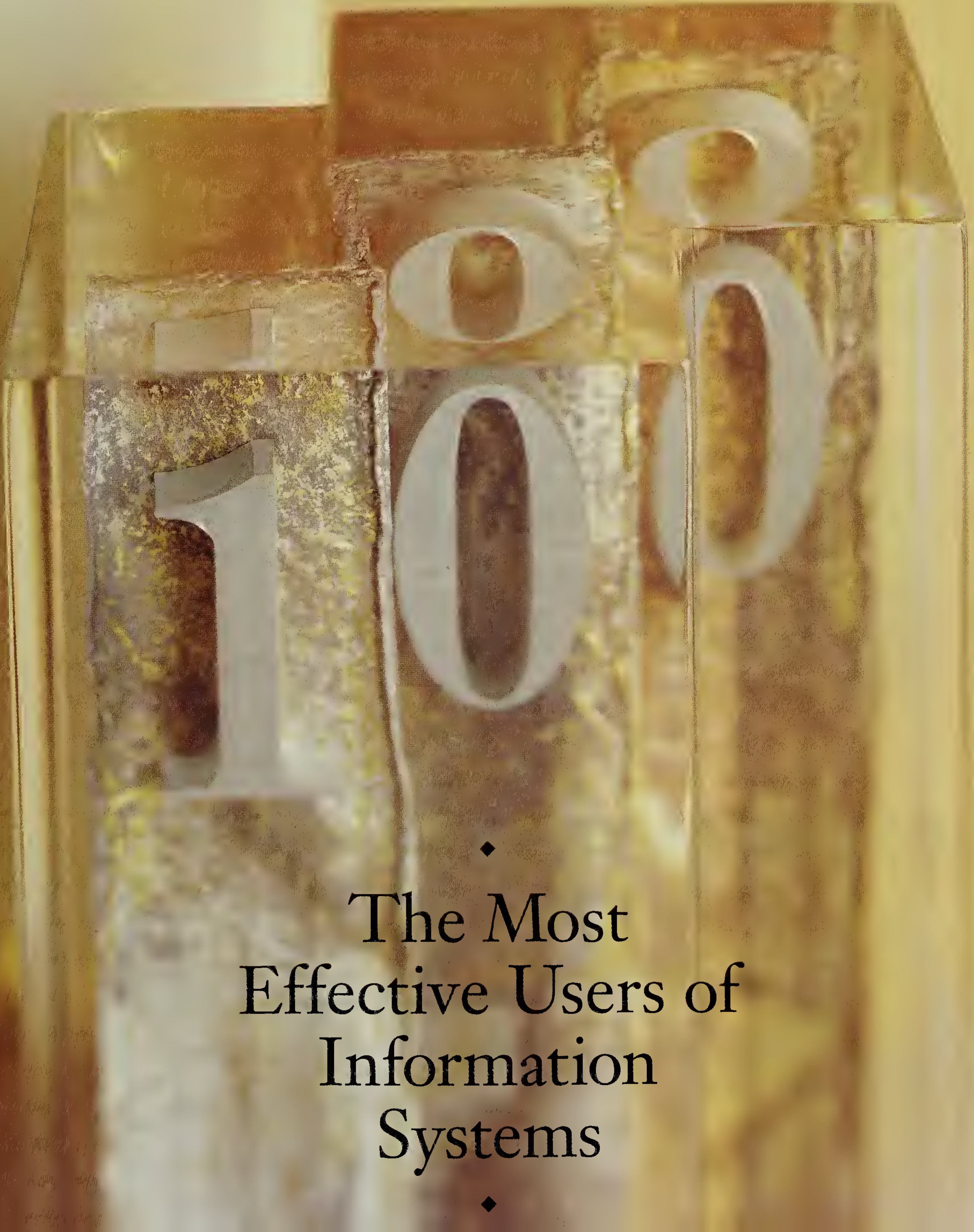
September 30, 1991 • Section 2 of 2

COMPUTERWORLD



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◆

The Most Effective Users of Information Systems

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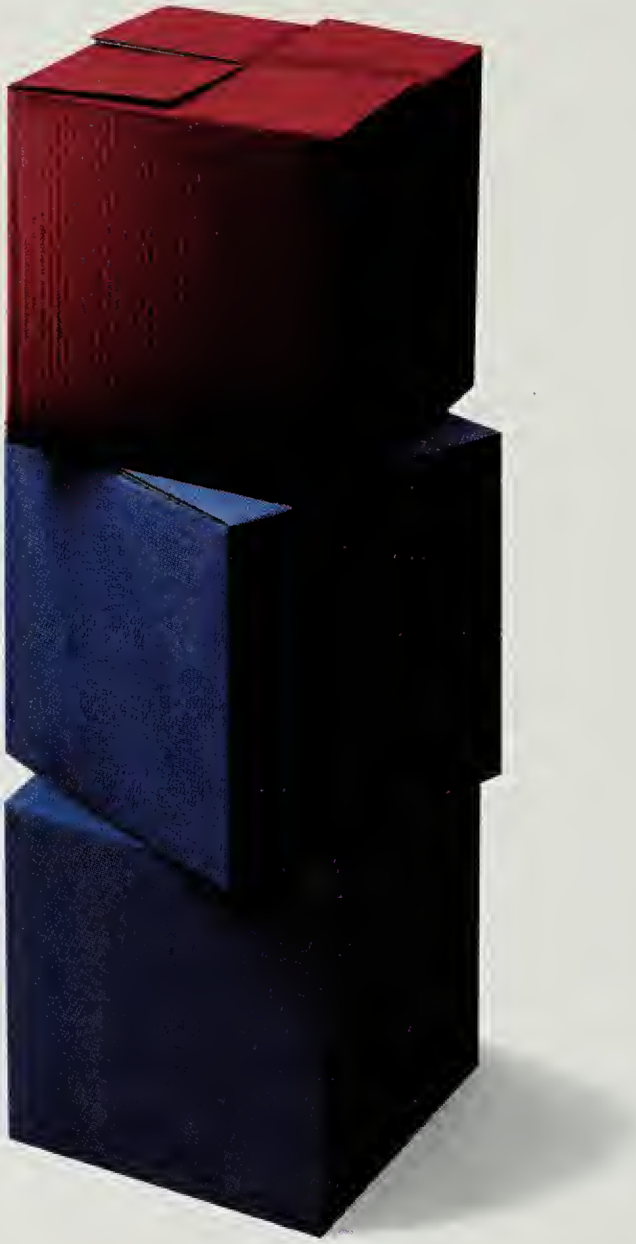

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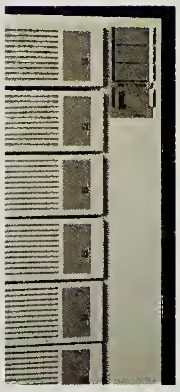

ipl
SYSTEMS

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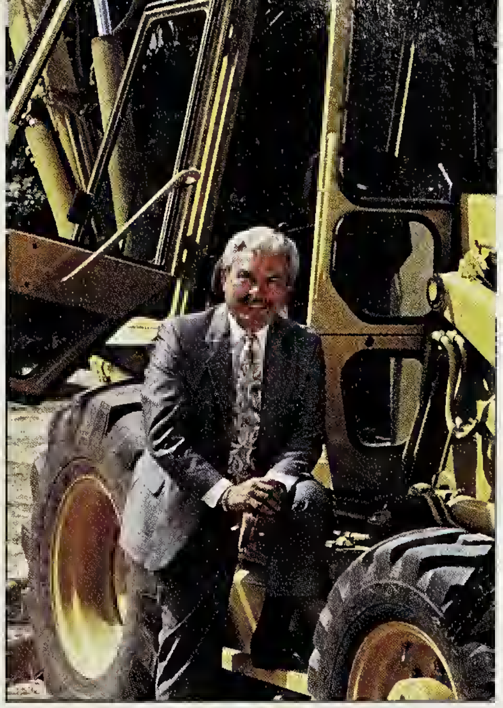
David Joel

John Nack *is saving Caterpillar $10 million through EDI*

Rich Frishman

Boeing's Norm Collins *leads effort to electronically design the new Boeing 777*

David Joel

John Reid *balances hybrid IS to meet Amoco's needs*

Katherine Lambert

MCI's Jim Zucco *runs one of the nation's largest software efforts*

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P.M. Designs

EVOLUTION 1991

Stella Johnson

The 1991 *Premier 100* Team: *(From left to right) Catherine Gagnon, Joseph Maglitta, Nancy Kowal, Michael Sullivan-Trainor and Lisa Davidson*

Staying on top today means balancing smart technology investments, cost-cutting measures and (seemingly endless) business restructurings. Gauging the effective use of IS is no less complex.

For this reason, the *Computerworld Premier 100* evolves each year to reflect the latest thinking on how to assess the nation's best users of technology. In 1991, we have made some of the most significant and important refinements ever. They include the following:

Peer ratings. Who can assess the best technology users better than those engaged in daily combat with them? With this is mind, we introduce a new peer rating criteria, based on how companies are seen by their colleagues. (Lists of the peer rating winners appear in each section, and the methodolgy is on page 13.)

De-emphasizing IS budgets. Brute spending is no sure measure of IS effectiveness, especially in tighter economic times. Because the doing-more-with-less challenge has become the rule in many IS shops, our weighting for budget was halved this year.

Greater emphasis on profitability. Although there is no direct relationship between IS spending and business success, a company that fails to make money can hardly be considered effective. The five-year average of profit growth, therefore, carries greater weight.

Vertical industry focus. Because computing requirements differ hugely from industry to industry, *Premier 100* candidates this year are compared only with other industry peers and not with all companies.

These refinements come in response to reader comments and are based on an extensive survey of IS experts.

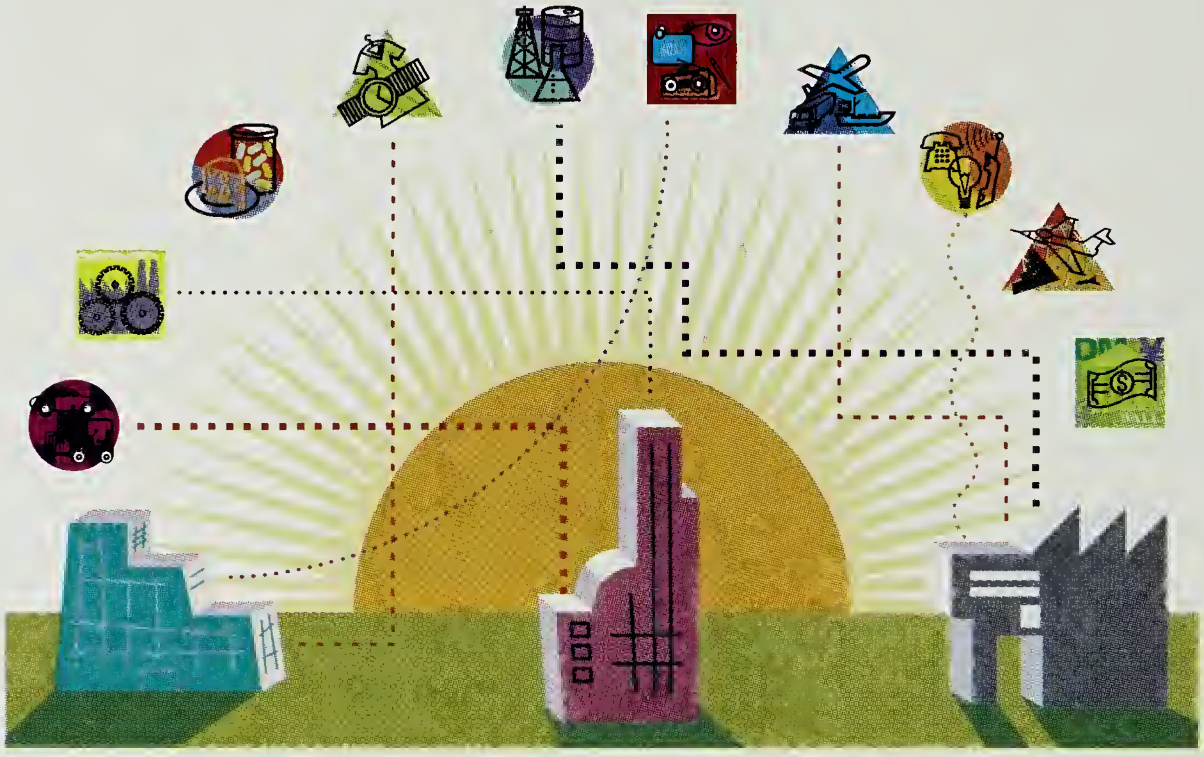
Please join us in congratulating this year's winners! They stand first among their peers and deservedly so.

Michael Sullivan-Trainor

Joseph Maglitta

Michael Sullivan-Trainor

Do The Right Thing(s)



Illustrations and inside icons by David Flaherty

By Joseph Maglitta

And Michael L. Sullivan-Trainor

The nation's best users of technology were not immune to the economic funk that clung to the U.S. during the last 12 months. But their information systems departments fared surprisingly well, even in beleaguered industries such as aerospace and banking. Some 58% of *Premier 100* IS groups actually got budget increases, and many enjoyed a newfound respect as hard-pressed chief executive officers hunted for ways to boost the bottom line.

"Companies are looking at areas that they can invest in wisely," notes William Dimoulas, vice president of IS and technology at **Long Island Lighting Co.**, and that often means technology.

But if you're looking to the *Premier 100* for a single quick fix — a magic formula for effective use of IS — forget it. Nothing distinguishes this year's top crop of computing organizations more than the variety of recession-busting tactics that they are employing to make technology pay off.

For example, some companies boosted IS spending as much as 12% (**Bear, Stearns & Co., Bristol-Myers Squibb Co., Principal Mutual Life Insurance Co.**), while others (**Deere & Co.**) are slashing costs. Some are centralizing applications and operations (**Ameritech Corp., Sears, Roebuck and Co., The Hertz Corp.**), others are decentralizing (**Caterpillar, Inc.**), and some are doing both at once (**AT&T, Amoco Corp.**). Some winners are acquiring companies and combining data centers (**Banc One Corp., GTE Corp.**), while others are selling businesses and consolidating (**McDonnell Douglas Corp., Black & Decker Corp.**).

Nonetheless, a few generalizations suggest what makes *Premier 100* companies more effective than the average IS shop.

For starters, most *Premier 100* companies are doing many things at once. Few have fallen into the trap of betting the business on The Big Project, the supersystem that will make competitive problems vanish in a puff of user-friendly smoke. Instead, smart organizations are fighting this year's battle for business survival on several carefully chosen fronts. A complex blend of technology, organization and business partnerships underlies most successful IS strategies.

"Things are certainly more complicated than a few years ago," says Marcia Hearst, assistant vice president of IS at **Metropolitan Life Insurance Co.** "Even in the technical area, it's hydra-headed."

Another element characterizing effective IS use boils down to what sounds like a classic management platitude: "Do the right things at the right time." Indeed, what especially distinguishes *Premier 100* companies is a keen grasp of the simple (but critically important) notion that what's right for one company can be disastrous for another.

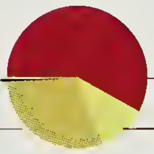
For most firms, the right thing starts with a look at the economy.

Surprise! Budgets keep rising

Despite recessionary pressures, the majority of IS groups will be getting budget increases next year — most a hefty 12% or more

What will your overall IS budget do in the coming year?

Percent of respondents; base: 100



By what percent will your IS budget *increase* in 1991-1992?

Number of respondents; base: 58

0%-2.9%	3%-4.9%	5%-6.9%	7%-9.9%	10%-12%	More than 12%	Don't know
3	**8**	**8**	**9**	**11**	**14**	**5**

By what percent will your IS budget *decrease* in 1991-1992?

Number of respondents; base: 11

0%-2.9%	3%-4.9%	5%-6.9%	7%-9.9%	10%-12%	More than 12%	Don't know
0	**0**	**3**	**1**	**2**	**3**	**2**

Money on their minds

There's no doubt that the recession weighs heavily on many IS chiefs. In a telephone survey conducted in August by First Market Research in Austin, Texas, one-third of *Premier 100* companies (and most in aerospace and manufacturing) named "coping with changing economics" as their industry's biggest challenge.

Their concern is understandable: Continued downsizing and flattening, coupled with the recession, have made "doing more with less" a cliche in practically every IS organization.

Who spends what

1991 average industry IS budgets as a percent of revenue for *Premier 100* companies

Utilities	**4.2%**
Transportation	**3.9%**
Aerospace	**3.7%**
Consumer products	**3.5%**
Financial services	**3.0%**
Industrial products	**2.1%**
Manufacturing	**1.9%**
Pharmaceuticals and Food	**1.9%**
Petroleum and Chemicals	**1.3%**
Retailing	**0.9%**

Predictably, the biggest challenges facing IS departments are also seen to be economic. Stretching IS dollars, finding new ways of doing things and making people more efficient was cited by 29% of firms as the top IS job for next year. More than one-third say the recession has resulted in deferred spending, cost reductions and budget cuts. Worst hit were petroleum, chemical and manufacturing.

"[The recession] has affected us rather dramatically," says Steve Hicks, data center director at **Clark Equipment Co.** "We're looking at the reduction of hardware. We won't eliminate hardware, but we probably will downgrade it. Then you have to look at personnel."

Despite such pressures, budget cuts affected only 11 *Premier 100* companies, including half of the aerospace firms. Reductions were scattered evenly among deferred capital investments, delayed hardware and software purchases and job freezes.

Tougher times have also prompted many companies to make sure they are getting the most of what they've already got. At Black & Decker, for instance, Sidney Diamond, vice president of worldwide information services, says the firm uses many new technologies. "But I don't think it is critical. There may be some mature, developed technologies that can do the job. PCs aren't new, for instance, but they may be used in some new ways."

Adds a manufacturing IS chief: "The recession has made us take another look at how effective we are in operations and adjust. In development, it made us focus more strongly on major projects and reduce in maintenance areas."

Metropolitan Life is a good example of a company that has tightened ship in several ways. In recent months, the $29 billion New York insurer has recentralized research and development projects, cut back on the use of outside consultants, frozen hiring and increased the use of videoconferencing to cut down on travel costs. Staff training is also being stepped up.

Yet in many cases, *Premier 100* winners will be doing more with *more*. Nearly 60% got budget increases for 1991-1992, including 90% of transportation companies. (In 1990, 53% got increases.) Roughly two-thirds of the extra money is slated for hardware and software, and the

Recession reverberations

The tightening economy is forcing IS to hold off on spending while squeezing the most from existing resources

In what other ways have current economic conditions affected IS operations?

• Budget cuts/Cost reductions/ Holding off on additional spending	**36%**
• Learning to do more with less/ New ways of conducting business/ Making people more efficient	**29%**
• There has been no effect	**21%**
• Slower project pace/Stalled development/Limiting expansion/Less R&D	**19%**
• Favorably – better handling of business systems and processes	**9%**
• Reduction/outsourcing of staff	**7%**
• Vendors have cut prices	**3%**

Base: 100; multiple responses allowed

rest of it is divided between IS staff and training.

By industry, utilities spent an average of 4.2% of revenues on IS, followed by transportation (3.9%) and aerospace (3.7%). At the low end were retailing (0.9%), petroleum and chemicals (1.3%).

Ironically, the recession has ended up being positive for some companies by underscoring the importance of technology. "In the past, say in '84 and '85, we got less than our share [of corporate funding]," says Long Island Lighting's Dimoulas. "Now, we're probably getting more than our share."

Next to budget gainers, the second largest group included those with flat or "zero-based" budgets. One-third of *Premier 100* companies fell into this category, compared with 21% a year earlier, including 70% of petroleum and chemical firms. In such companies, new or unanticipated projects may be funded on a project-to-project basis.

Interestingly, almost one-fifth of companies say that the recession had no effect at all on their information systems. Good long-term budgeting is credited with shielding from the blows.

"We have been very conservative in our budgeting," explains Carl A. Kuhrmeyer, vice president of administration and chief information officer at 3M Co. "We have very stringent hiring controls. Any staff reductions resulting from lower 1991 earnings will be handled through attrition," he says.

Regardless of whether budgets have risen or fallen, recession in many cases has whetted appetites for technology. Almost three-fourths (and all retailers) say that over the next 12 months they will install systems to provide competitive advantage. This total is up from last year's poll in which about two-thirds answered yes.

Peerless performers

Top 1991 *Premier 100* companies based on peer ratings from 250 companies

1. Federal Express Corp.
2. Banc One Corp.
3. AMR Corp.
4. Wal-Mart Stores, Inc.
5. 3M Co.
6. The Boeing Co.
7. Delta Air Lines
8. Amoco Corp.
9. Mead Corp.
10. Air Products & Chemicals, Inc.

Dave Kaufman, director of information systems at **Pepsico, Inc.**, is among the true believers. "The biggest advantage is having instantaneous information on the effectiveness of your promotions in the marketplace so that you can adjust what you're doing according to people's reaction," he says. "If you can get that information quicker, you have the advantage."

Also growing, one IS manager says, is the realization that "you gain competitive advantage through products supported by technology, not the technology itself."

At **Grumman Corp.**, technology is being examined closely as a cost-cutter, especially in process areas, says John Belmont, vice president of operations.

Merck & Co. is exploring the use of electronic imaging systems to create a sterile vaccine manufacturing plant by employing three-dimensional modeling to help design vaccines for acquired immune deficiency syndrome and other diseases.

While individual industry needs differ, imaging systems, local-area networks and expert systems are seen as the most important emerging technologies (see industry charts, beginning on page 14). Still, zeal for new technology varies widely.

"We use no technology before its time," says David Billings, vice president of information and technology systems at **Airborne Freight Corp.** He says the firm leaves technology pioneering to others.

At the other end of the spectrum is **MCI Communications Corp.**, a four-time *Premier 100* winner that employs a wide range of new technology to keep its software-driven products rolling out.

Improved customer service, understanding business systems and architectures, more user control and involvement as well as accessibility to information and

Continued on page 12

TRENDS '91

Following are highlights from the 1991 telephone survey of *Premier 100* companies.

Rise in end-user spending. As more firms decentralize, technology spending by end-user departments continues to climb. Sixty percent of companies expect the amount users spend on computers and networks to increase over the next year. The biggest jumps are predicted for food and pharmaceutical companies, as well as for financial services. Lowest: utilities.

Use of commercial integrators steady. Fifty-five percent will use a commercial systems integrator over the next year; 35% say no. Heaviest interest comes from industrial, utility, petroleum and chemical companies. Least likely to use are financial services.

Consolidation slows. A hot issue last year, this trend has cooled, probably because many companies are well along in reorganization plans. Fifty-five percent consider it unlikely that they will consolidate data centers this year. Still, 41% say it's "very likely" or "somewhat likely." Aerospace and utilities firms voice the most interest, industrial products and manufacturing companies express the least.

IS chiefs expect to spend the most attention on sales and marketing departments (54%), followed by finance and administration (24%) and manufacturing (19%).

Security programs grow. Eighty-one percent of companies say it's likely they will implement data security measures over the next 12 months. Top choice: new security tools or features (39%).

Measurement programs wane. Sixty-five percent of companies have programs in place to measure the effectiveness of their IS operations. This compares with nearly 75% last year.

Maintenance and application backlogs still stuck. No great hope here. Over the next year, 31% of companies expect their maintenance work to increase, 24% to decrease and 44% to stay about the same. Figures are similar for application backlogs: Twenty-nine percent expect it to improve, 27% to worsen and 41% to stay about the same.

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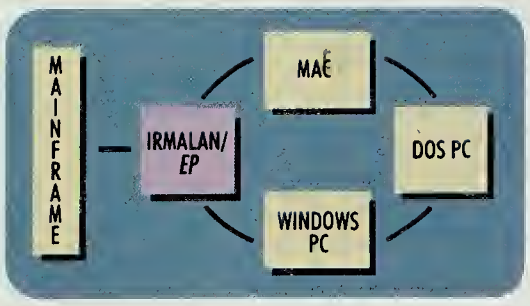

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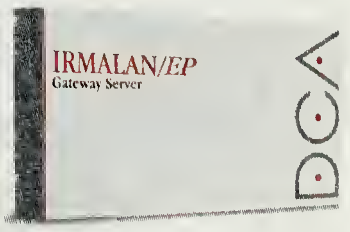

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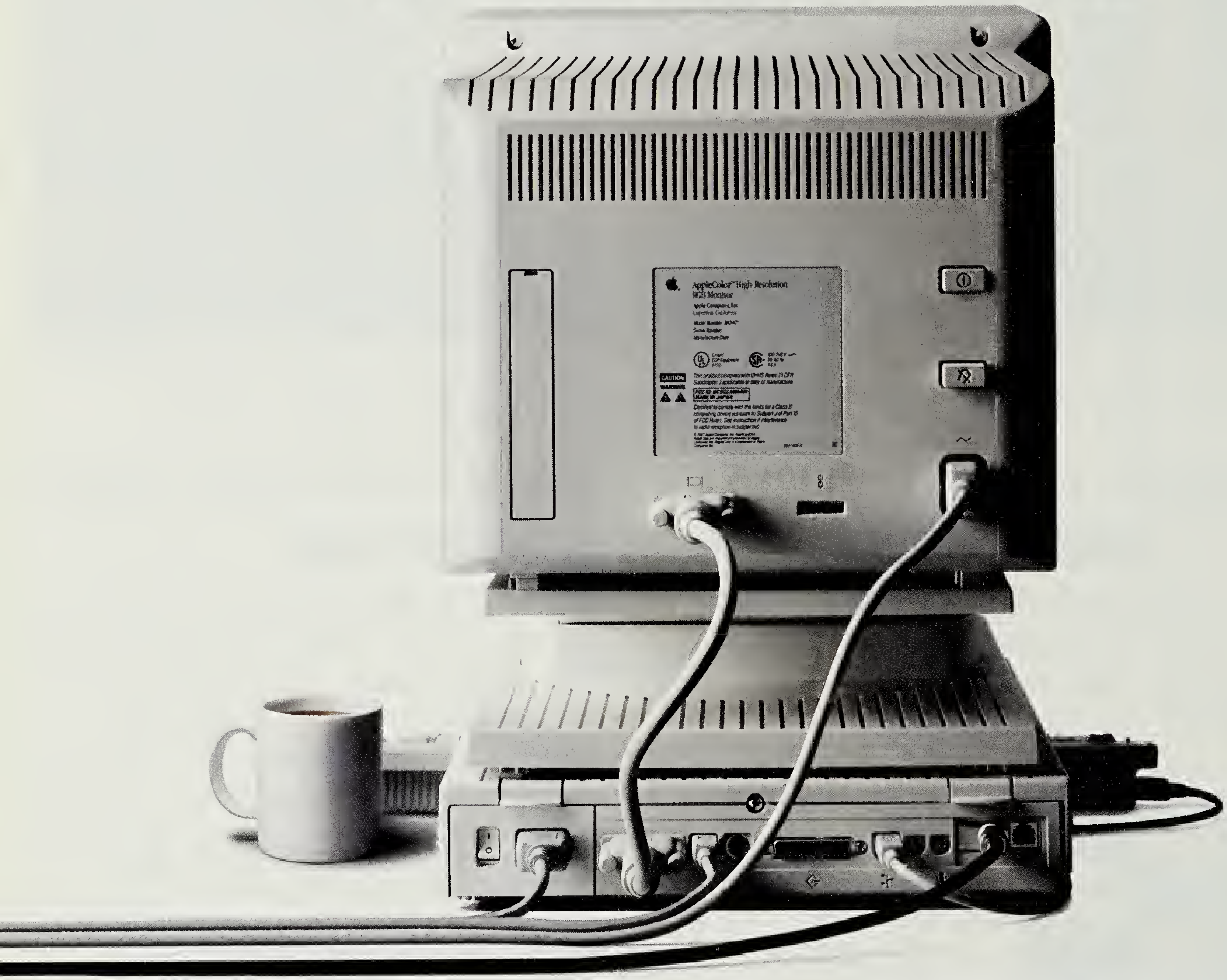
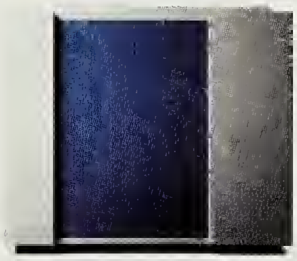
To a mainframe it's a terminal.



From the back, a Macintosh is as easy on IS managers as the front is on your people. The same coax cable that hooks to an IBM 3278 terminal plugs right into the Mac through an easily installed card. Just click the mouse, and it's configured.



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Continued from page 8

good technical support were mentioned frequently as contributors to IS success.

But the biggest reason cited by *Premier 100* winners has nothing to do with technology. Instead, "teamwork" and "management support" were identified by 40% as the most important factors in making or breaking a technology effort.

"Teamwork is important," affirms Alex Gibbons, corporate director of MIS at Bristol-Myers Squibb. "Decisions can't be made in a vaccum." Clark Equipment's Hicks defines it this way: "[Teamwork] is getting the creativity of everyone involved, instead of everyone finding out about a new decision when it's already on the paper in black and white." Companies are doing more than talking, too.

American Airlines, for example, has started a program called "Commitment To Leadership," which includes IS. The goal is to push down decisions to the lowest possible level, explains Brian Fornear, director of client services for **AMR Corp.**, American's parent company. At **Northwestern Mutual Life Insurance Co.**, the vice president of applications sits on the company's marketing strategy committee. An innovative effort at **The Boeing Co.** makes IS an integral part of 200 "design/build" teams working on the new Boeing 777.

This kind of teamwork makes good sense, says Gibbons, whose business units share a "super data center" and a network. "It results in cost savings, management efficiencies and more features for more people."

Biggest challenges

Retooling business processes and getting tight with other business groups tops the list of concerns for 1992

What will be the biggest challenges facing your IS organization in the coming year?

• Re-engineer business functions/ Incorporate changing technology	**47%**
• Globalization/Consolidation/ Close interfacing with other business activities	**24%**
• Reducing overall expenditures/ Better allocation of resources	**19%**
• Improving productivity/ Staying competitive	**18%**
• Meeting demands of clients	**13%**
• Finding quality employees/ Personnel challenges	**9%**
• Getting full potential out of business environment	**8%**

Base: 100; multiple responses allowed

Several other trends mark information technology use at *Premier 100* companies:

High interest in re-engineering.

The idea of rethinking business processes using IS is hot. In fact, re-engineering was identified by 47% of respondents as the "single biggest challenge" facing IS in the coming year. While more people are talking than doing right now, it's clear that many — especially retailing, manufacturing and consumer products companies — will take the plunge. A whopping 92% of respondents say it's "very likely" or "somewhat likely" that their organization will re-engineer a business process over the next 12 months.

Silicon swords

Premier 100 *winners, especially retailers, are still hot on using information technology as a competitive weapon*

During the next 12 months, how likely is it that your organization will install any information systems with the purpose of providing a competitive advantage?

Percent of respondents; base: 100

Very likely	Somewhat likely	Not very likely	Not at all likely
74%	**17%**	**4%**	**5%**

Downsizing mainframe applications.

Gloomy economics has quickened interest in shifting applications from mainframes to networked smaller systems. **Worldcorp, Inc.**, for example, traded an IBM mainframe for Unix-based workstations from Sun Microsystems, Inc. Projected savings are $1.5 million. **The Dun & Bradstreet Corp.** continues a multiyear project to make more information available to 70,000 employees by shifting databases from IBM mainframes to lower cost PCs. **General Electric Co.**'s aerospace unit recently began migrating to a client/server Unix network based on Sun workstations.

Move to open systems and networks.

Closely related to downsizing is a strong push by many organizations away from closed systems and toward open communications links.

A few examples are as follows: Caterpillar added 100 nodes to worldwide networks. **JC Penney Co.** is testing the use of Integrated Services Digital Network to link LANs at Penney stores. Rival **Kmart Corp.** continues efforts to link its 2,300 stores by completing work on its Kmart Information Network II. **Federal Express Corp.** embarked on a 3½-year project to shift its much-admired Cosmos worldwide tracking system over to a Unix-based distributed system.

In total, 67% of companies say they are likely to roll out nonproprietary systems over the next year.

Customer service focus.

With customer service a strong contender for the corporate obsession of the year, it's little wonder that creating systems to improve customer service was seen as a top priority. Some 21% of *Premier 100* winners consider this the most important task facing them. In consumer products and diversified services, the figure rises to 64%.

"Our buyers want to deal with decision makers," explains Tom Gildea, vice president of business information systems at **Helene Curtis Industries, Inc.** The personal care company equips its sales force with laptop computers that can perform on-the-spot analysis and other services for customers. Merck has done much the same for its 3,000-person worldwide sales force, as has AT&T.

Many companies have added on-truck terminals and computers. **Alaska Air Group, Inc.** rolled out several customer service-oriented applications last year, including systems for its frequent-flier program, flight scheduling and meal planning.

Global expansion.

While worldwide recession has slowed global expansion, it hasn't stopped it entirely. Approximately 62% of *Premier 100* firms will expand overseas in 1991 and 1992.

Eastman Kodak Co., for example, is stretching its Open Systems Interconnect backbone to link two new overseas data centers to its Rochester, N.Y., headquarters. **Gillette Co.** is continuing a 2½-year project to connect operations in the U.S., Canada and Europe. 3M is expanding its highly successful 3Mnet beyond the U.S. and Europe to Japan.

Continued interest in outsourcing.

Like re-engineering, this area is still mostly talk. While 64% say they will explore outsourcing, only about 13% expect to let an outsider take over all or part of their IS operations. Predictably, 90% of hard-pressed petroleum and chemical firms will consider the option; few retailers will.

HOW WE RANK THE PREMIER 100

A Guide To The Tables

TARGET GROUP

To qualify for *Computerworld's Premier 100*, a company must be in the top half of its industry as listed in the "Fortune Industrial 500" or "Fortune Service 500." Only parent companies are ranked. Organizations that make the majority of their revenue from the sale of information systems are not included. This year, the target group was increased from 500 to 600 companies in order to include an even wider range of firms.

DATA GATHERING

Premier 100 companies are ranked based on data gathered in extensive mail and telephone surveys. Data is collected from the chief information systems executive. In cases where the company does not supply data, *Computerworld* generates estimates, based on market research and other industry sources.

RANK CALCULATION

Overall scores are based on the sum of point totals of seven criteria: 1) IS budget, weighting: 15; 2) profit growth average, weighting: 15; 3) current market value, weighting: 15; 4) staff spending, weighting: 10; 5) training spending, weighting: 15; 6) personal computers and terminals, weighting: 15; and 7) peer rating, weighting: 15. Rankings are assigned for each criterion separately for all firms in the target group. Point totals are then calculated by multiplying the ranking for each criterion by the weighting for that item. Companies are then ranked within their industry group based on the total achieved points for all criteria.

IS BUDGET

The figures represent 1991 totals for corporatewide capital and operating IS budgets. Not included are telecommunications costs or spending conducted by user departments. The budget is measured as a percentage of total revenue. A company's budget/revenue percentage is then compared with the average for IS spending as a percentage of revenue for that company's industry.

PROFIT GROWTH AVERAGE

Profits used in the ranking are after taxes and after extraordinary credits or charges. Profits for mutual insurance companies are based on net income. The ranking employs a rolling, five-year growth average. In the 1991 edition, profits for 1986, 1987, 1988, 1989 and 1990 were considered.

CURRENT MARKET VALUE

Figures are totals for the current market value for major processors, specifically supercomputers, mainframes and minicomputers. They reflect the total dollar value of systems within the entire company. The value is calculated based on what the systems would be worth if they were sold on the market today. This figure is then divided by total revenue.

STAFF AND TRAINING SPENDING

Training and staff figures include all costs. Spending is measured as a pecentage of the IS budget. Fewer points are given for a larger percentage spent on staff. More points are given for a larger percentage spent on training.

PCS AND TERMINALS

The total number of personal computers and terminals include systems within the entire organization. This number is divided by the total number of employees to obtain the ratio. A higher ratio garners more points than a lower one.

PEER RATING

The listings for peer ratings given by each industry group are featured in charts in each industry section. These ratings and point totals are based on respondents' answers to the following question: "Which companies are the top five most effective users of information systems in your industry?"

Companies accumulate peer rating points by receiving the most votes in their industry category. Respondents are not allowed to vote for themselves. These votes were tabulated by *Computerworld,* and the company with the most votes for the highest rank positions received the highest amount of peer rating points.

WORKSHEET AVAILABLE

Readers can obtain a copy of the worksheet to calculate an approximation of where their firm would rank and compare it with *Premier 100* companies by writing to Michael L. Sullivan-Trainor, *Computerworld,* 375 Cochituate Rd., Framingham, Mass. 01701. No telephone calls please.

ACKNOWLEDGMENTS

EXPERT GUIDANCE

The *Premier 100,* now in its fourth year, has been developed and guided by information systems industry experts including academics, consultants and IS executives. *Computerworld* collects and consolidates this input together with the best information available on how companies evaluate their IS efforts to develop the criteria for ranking the most effective users of information systems each year. This year, special attention was paid to improving the ranking formula and presentation to make the information even more useful to IS executives.

We would like to thank the following individuals and companies for their contributions to this effort: Len Bergstrom, Real Decisions Corp.; Charles V. Callan, Index Group; Thomas H. Davenport, Center for Information Technology and Strategy, Ernst & Young; Marge Hayes, Ashton Hayes Group; Richard Katzman, independent consultant; John F. Rockart, Center for Information Systems Research, MIT; John G. Sifonis, Temple, Barker & Sloane, Inc.

We would also like to thank the following IS executives for their contributions: Dennis Lahood, Agway; James Marston, American President Cos.; Sidney Diamond, Black and Decker Corp.; George Fugere, Bethlehem Steel Corp.; Richard Fishburne, Burlington Holdings, Inc.; Don Hurley, General Dynamics Corp.; Larry Braby, JC Penney, Inc.; Tod Dixon, Northeast Utilities; William D. Friel, Prudential Insurance Co.; Edward B. Parrish, Sun Co., Vin Lombardo, The Travelers Corp.

In addition, we would like to thank all the IS executives and staff who responded to the survey. Without their input, this ranking would not be possible.

The 100 Most Effective Users of Information Systems

'91 Industry rank	Company, Top IS executive, Title	Total score	Profit growth 1986-1990	Peer rating points	IS budget (millions)
Aerospace					
1	**The Boeing Co.** Art Hitsmon, President, Boeing Computer Services	54,080	27.5%	8,850	$1,300
2	**Northrop Corp.** Herb Anderson, V.P. and General Manager	53,105	34.8%	8,625	$285
3	**Grumman Corp.** Gerald H. Sondler, President, Data Systems Division	52,850	23.3%	8,580	$159
4	**Martin Marietta Corp.** Raymond S. Wiltshire, V.P.	52,540	15.5%	8,685	$320
5	**McDonnell Douglas Corp.** Ernie Ridenhour, V.P.	50,525	6.7%	8,565	$700
6	**Lockheed Corp.** Dean O. Allen, V.P. and CIO	50,110	12.9%	8,550	$276
7	**Rockwell International Corp.** J. F. Sutter, V.P. and General Manager	49,170	1.5%	8,550	$260
8	**Gencorp, Inc.*** Linda George, Director	48,770	11.0%	8,595	$42
9	**Raytheon Co.** Robert B. Almeido, Director	48,330	9.2%	8,535	$197
10	**United Technologies Corp.*** Robert Forte, Director	48,010	31.2%	8,535	$840
	Average	50,749	17.4%	8,607	$437.9
Consumer Products and Services					
1	**Helene Curtis Industries, Inc.** Tom Gildeo, V.P.	53,900	12.8%	8,535	$22
2	**The Hertz Corp.** Gary Orrell, Staff V.P.	53,305	23.9%	8,565	$110
3	**Reader's Digest Association, Inc.** Kenneth A. Nelson, V.P. and Director	53,010	25.6%	8,550	$98.9
4	**Gillette Co.*** Herbert Moller, Director	51,255	38.0%	8,550	$113
5	**The Dun & Bradstreet Corp.*** Michael S. Field, President, Information Group	51,145	11.7%	8,535	$750
6	**Tyco Laboratories, Inc.*** Louis Chiesa, V.P.	49,430	46.8%	8,535	$13
7	**Alberto-Culver Co.*** Rich Pulsen, V.P.	49,275	51.2%	8,535	$7
8	**Avon Products, Inc.*** Raymond Perry, CIO	49,240	37.5%	8,640	$37
9	**Clorox Co.*** Raymond Johnson, V.P.	48,610	13.7%	8,640	$14
10	**Humana, Inc.*** Fred Pirmon, Senior V.P.	48,155	37.9%	8,535	$72
	Average	50,733	29.9%	8,562	$123.7
Financial Services					
1	**Northwestern Mutual Life Insurance Co.** Edward A. Flitz, V.P.	53,440	49.5%	8,700	$51.2
2	**Aetna Life & Casualty Co.** John D. Loewenberg, Senior V.P.	53,425	36.6%	8,535	$600
3	**Massachusetts Mutual Life Insurance Co.** John J. Pojok, Executive V.P.	53,195	37.1%	8,685	$78.2
4	**Mellon Bank Corp.** David A. Moore, Senior V.P.	53,100	18.7%	8,685	$193.6
5	**Primerica Corp.** Ed Sherin, Senior V.P. and CIO	52,480	19.9%	8,550	$232.2

Listings continue on the following page

* Estimates are from *Computerworld* sources, not the company

NA = Not available

IS budget as % of revenue	Processor market value (millions)	Market value as % of revenue	1991 IS staff	% of IS budget for staff	% of IS budget for training	Total PCs and terminals	PCs/terminals: employees
4.71%	$1,600	5.80%	13,500	53%	2%	103,500	.65:1
5.18%	$29.5	.54%	1,900	40.8%	2%	22,500	.59:1
3.93%	$70	1.73%	2,000	47%	3%	17,000	.68:1
5.21%	$104	1.69%	2,200	35%	1%	23,800	.61:1
4.28%	$300	1.83%	3,700	29%	3%	70,000	.58:1
2.77%	$250	2.51%	1,928	45%	5%	47,000	.66:1
2.09%	$150	1.21%	2,739	38%	4%	58,700	.59:1
2.34%	$16	.88%	NA	36%	5%	8,700	.63:1
2.10%	$44.6	.48%	1,232	42%	4%	32,739	.43:1
3.86%	$92	.42%	NA	46%	1%	35,918	.19:1
3.65%	$265.6	1.71%	NA	41.8%	3%	41,985.7	.56:1
2.68%	$10.5	1.20%	150	40%	3.5%	2,500	93:1
4.13%	$43	1.61%	700	30%	1%	10,000	.53:1
4.81%	$8.5	.41%	1,017	43.3%	3%	4,289	.58:1
2.57%	$85	1.93%	NA	50%	5%	8,500	.28:1
15.57%	$150	3.11%	NA	45%	3%	50,000	.83:1
.60%	$16	.75%	NA	43%	3%	2,979	.21:1
.88%	$5	.59%	NA	47%	2%	1,204	.2:1
1.05%	$21	.60%	NA	41%	2%	5,909	.2:1
.93%	$14	.93%	NA	44%	2%	2,221	.4:1
1.48%	$32	.65%	NA	39%	4%	8,941	.14:1
3.51%	$38.5	1.17%	NA	42.2%	2.9%	9,654.3	.43:1
.74%	$15	.22%	507	46%	3%	3,038	1.02:1
3.09%	$70	.36%	4,900	41%	2%	43,500	.93:1
1.17%	$16.2	.24%	873	56.9%	2%	6,960	1.22:1
5.57%	$50	1.44%	1,511	23.6%	1%	17,953	1.14:1
3.75%	$30.3	.49%	1,424	30%	3%	17,187	.72:1

The 100 Most Effective Users of Information Systems

'91 Industry rank	Company, Top IS executive, Title	Total score	Profit growth 1986-1990	Peer rating points	IS budget (millions)
Financial Services					
6	**Principal Mutual Life Insurance Co.** Robert W. Deloney, V.P.	52,405	42.3%	8,580	$64.0
7	**Bear, Stearns & Co.** W. Ben Kuenemonn, Senior Managing Director	52,270	14.2%	8,535	$99.5
8	**Metropolitan Life Insurance Co.** Doniel J. Covonogh, CIO	51,545	17.7%	8,670	$250.0
9	**U.S. Bancorp, Inc.** Tim Meier, Manager	51,130	24.4%	8,625	$52.4
10	**Banc One Corp.** Dovid Von Leor, President, Services Corp.	51,095	(2.9%)	8,985	$258.0
	Average	52,409	25.7%	8,655	$187.9
Industrial Products					
1	**Caterpillar, Inc.** Dole Fieldcomp, Corporate Director	53,980	24.7%	8,730	$300
2	**Deere & Co.** Poul F. Ohmon, V.P.	52,530	51.6%	8,760	$189
3	**Paccar, Inc.*** Bruce Carlson, General Manager	51,945	31.8%	8,580	$71
4	**The Timken Co.*** Robert Leibensterger, V.P.	51,790	45.8%	8,640	$37
5	**Clark Equipment Co.*** Faster Martin, Director	51,560	52.1%	8,535	$28
6	**Black & Decker Corp.** Sidney Diamond, V.P.	51,360	46.7%	8,745	$85
7	**Dresser Industries, Inc.*** Henry Poulsen, Director	50,665	77.8%	8,535	$112
8	**Great Amer. Mgmt. & Invt., Inc.*** Michoel J. Corcaron, Manager	50,165	25.0%	8,535	$46
9	**York Holdings Corp.*** Orville N. Trembly, Director	50,015	24.0%	8,535	$30
10	**Harnischfeger Industries, Inc.*** Seon Brodley, Director	49,780	50.7%	8,580	$27
	Average	51,379	43.0%	8,618	$93
Manufacturing					
1	**3M Co.** Corl A. Kuhrmeyer, V.P. and CIO	51,650	14.2%	8,850	$400
2	**Mead Corp.*** John Longenbahn, V.P.	51,615	10.3%	8,805	$56
3	**Eastman Kodak Co.** Kotherine M. Hudson, V.P. and Corporate Director	50,615	22.3%	8,610	$500
4	**General Electric Co.*** Edword Skiko, V.P.	50,300	14.7%	8,580	$1,029
5	**Lafarge Corp.*** Brian Powell, Director	50,050	42.5%	8,535	$15
6	**Loral Corp.*** Hazeljeon Adams, Manager	49,830	11.2%	8,535	$16
7	**Temple-Inland, Inc.*** Jomes Thamas, Director	49,765	33.0%	8,535	$27
8	**Boise Cascade Corp.** Jomes E. Horder, Director	48,560	14.8%	8,535	$80
9	**Polaroid Corp.** A. L.. Hylond, Director	48,485	(.8%)	8,565	$64
10	**Inland Steel Industries, Inc.** Williom Howord, V.P.	48,280	17.1%	8,640	$69
	Average	49,915	17.4%	8,619	$226

* Estimates are from *Computerworld* sources, not the company NA = Not available

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- **30.** Medicine/Law/Education
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- **50.** Business Service (except DP)
- **60.** Government - State/Federal/Local
- **65.** Communications Systems/Public Utilities/Transportation
- **70.** Mining/Construction/Petroleum/Refining/Agric.
- **80.** Manufacturer of Computers, Computer-Related Systems or Peripherals
- **85.** System Integrators, VARs, Computer Service Bureaus, Software Planning & Consulting Services
- **90.** Computer/Peripheral Dealer/Distr./Retailer
- **75.** User: Other __________
- **95.** Vendor: Other __________ (Please specify)

2. TITLE/FUNCTION (Circle one)

IS/MIS/DP MANAGEMENT
- **19.** Chief Information Officer/Vice President/Asst. VP IS/MIS/DP Management
- **21.** Dir./Mgr. MIS Services, Information Center
- **22.** Dir./Mgr. Tech. Planning, Adm. Svcs., Data Comm. Network Sys. Mgt.; Dir./Mgr. PC Resources
- **23.** Dir./Mgr. Sys. Development, Sys. Architecture
- **31.** Mgrs., Suprv. of Programming, Software Dev.
- **32.** Programmers, Software Developers
- **60.** Sys. Integrators/VARs/Consulting Mgt.

OTHER COMPANY MANAGEMENT
- **11.** President, Owner/Partner, General Mgr.
- **12.** Vice President, Asst. VP
- **13.** Treasurer, Controller, Financial Officer
- **41.** Engineering, Scientific, R&D, Tech. Mgt.
- **51.** Sales & Mktg. Management

OTHER PROFESSIONALS
- **70.** Medical, Legal, Accounting Mgt.
- **80.** Educator, Journalists, Librarians, Students
- **90.** Others __________ (Please specify)

3. COMPUTER INVOLVEMENT (Circle all that apply)
Types of equipment with which you are personally involved either as a user, vendor, or consultant.
- **A.** Mainframes/Superminis
- **B.** Minicomputers/Small Business Computers
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- **D.** Communications Systems
- **E.** Local Area Networks
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IS budget as % of revenue	Processor market value (millions)	Market value as % of revenue	1991 IS staff	% of IS budget for staff	% of IS budget for training	Total PCs and terminals	PCs/terminals: employees
.74%	$18.0	.21%	741	42.0%	1.0%	11,200	.84:1
4.17%	$15.8	.66%	421	49.8%	4.0%	5,500	.98:1
.92%	$48.0	.18%	2,584	39.0%	4.0%	43,265	1.01:1
2.73%	$26.5	1.38%	439	43.2%	.2%	12,000	1.18:1
7.36%	$52.0	1.48%	1,450	80.0%	12.0%	26,500	1.04:1
3.02%	$34.2	.67%	NA	45.1%	3.0%	17,936	1.01:1
2.60%	$600	5.20%	2,800	48%	3%	40,000	.70:1
2.40%	$36	.46%	1,400	42%	2%	18,800	.50:1
2.52%	$33	1.16%	NA	42%	4%	3,769	.33:1
2.18%	$19	1.12%	NA	41%	5%	5,110	.27:1
1.91%	$14	1.00%	NA	39%	4%	2,889	.30:1
1.74%	$80	1.64%	650	28%	3%	10,000	.23:1
2.47%	$44	1.00%	NA	46%	5%	9,420	.28:1
1.89%	$24	1.00%	NA	40%	4%	4,600	.30:1
2.07%	$14	1.00%	NA	39%	4%	2,706	.30:1
1.50%	$12	.64%	NA	46%	3%	3,538	.29:1
2.13%	$88	1.42%	NA	42%	3.7%	10,083	.35:1
3.07%	$250	1.92%	3,200	60%	8.0%	45,000	.57:1
1.17%	$45	.94%	NA	61%	5.0%	18,273	.85:1
2.62%	$50	.26%	3,500	40%	2.5%	75,000	.56:1
1.76%	$264	.45%	NA	39%	5.0%	153,266	.51:1
.94%	$10	.63%	NA	40%	3.0%	1,543	.20:1
1.22%	$16	1.22%	NA	42%	4.0%	8,451	.67:1
1.12%	$11	.46%	NA	44%	7.0%	3,329	.24:1
1.91%	$14	.32%	511	29%	1.6%	5,850	.30:1
3.20%	$36	1.79%	450	47%	3.5%	5,600	.49:1
1.78%	$14	.36%	496	41%	1.2%	5,790	.28:1
1.88%	$71	.84%	NA	44%	4.1%	32,210	.47:1

The 100 Most Effective Users of Information Systems

'91 Industry rank	Company, Top IS executive, Title	Total score	Profit growth 1986-1990	Peer rating points	IS budget (millions)
Petroleum and Chemicals					
1	**Amoco Corp.** John R. Reid, V.P.	52,480	32.7%	8,805	$312
2	**Unocal Corp.** Paul R. Jones III, Corporate Director	52,090	44.1%	8,535	$141
3	**Dow Chemical Co.** Donald S. Pirkle, V.P.	51,775	30.7%	8,715	$368
4	**Phillips Petroleum Co.** P. J. Gottardi, Manager	51,610	28.8%	8,685	$203
5	**Freeport-McMoRan, Inc.** Ron P. Landry, Director	51,500	43.4%	8,640	$15
6	**Air Products & Chemicals, Inc.** Peter W. C. Mather, V.P.	51,485	38.1%	8,760	$51
7	**Chevron Corp.*** William Bartz, Manager	50,960	32.7%	8,745	$182
8	**B. F. Goodrich Co.*** Matthew J. Battista, V.P.	50,850	63.6%	8,535	$25
9	**USX Corp.*** Richard Robinson, Manager	50,815	53.1%	8,535	$177
10	**Atlantic Richfield Co.** John Coman, Manager	50,615	38.7%	8,640	$236
	Average	51,418	40.6%	8,660	$171
Pharmaceuticals and Food					
1	**Merck & Co.** Bill Pater, Executive Director	52,590	27.6%	8,640	$210
2	**Bristol-Myers Squibb Co.** Alex J. Gibbons, Corporate Director	51,235	40.3%	8,580	$195
3	**Pfizer, Inc.*** William Mullin, V.P.	50,695	38.6%	8,535	$20
4	**Eli Lilly and Co.*** Lee Gery, Director	50,035	19.2%	8,670	$42
5	**Becton, Dickinson & Co.** Roland Cyr, V.P.	49,965	10.8%	8,535	$50
6	**Upjohn Co.*** Susan Barber, Director	49,550	21.5%	8,595	$53
7	**Johnson & Johnson*** Paul DeMarco, Supervisor	49,540	46.6%	8,640	$215
8	**Schering-Plough Corp.*** Don Langston, Director	49,150	20.8%	8,565	$40
9	**Abbott Laboratories*** Kenneth Farmer, V.P.	48,045	15.7%	8,625	$159
10	**Pepsico, Inc.** Allan B. Deering, V.P.	46,360	24.0%	8,535	$265
	Average	49,717	26.5%	8,592	$125
Retailing					
1	**Sears, Roebuck and Co.** Charles A. Carlson, President, Technology Services	50,230	.7%	8,610	$1,172
2	**Wal-Mart Stores, Inc.*** Robert L. Martin, Senior V.P.	47,980	21.2%	8,910	$326
3	**Kmart Corp.** David M. Carlson, Senior V.P.	47,960	27.3%	8,700	$216
4	**Service Merchandise Co.*** Jack Case, Senior V.P.	47,885	44.8%	8,535	$26
5	**Food Lion, Inc.*** A. Edward Benner Jr., V.P.	47,365	29.4%	8,535	$44

Listings continue on the following page

* Estimates are from *Computerworld* sources, not the company

NA = Not available

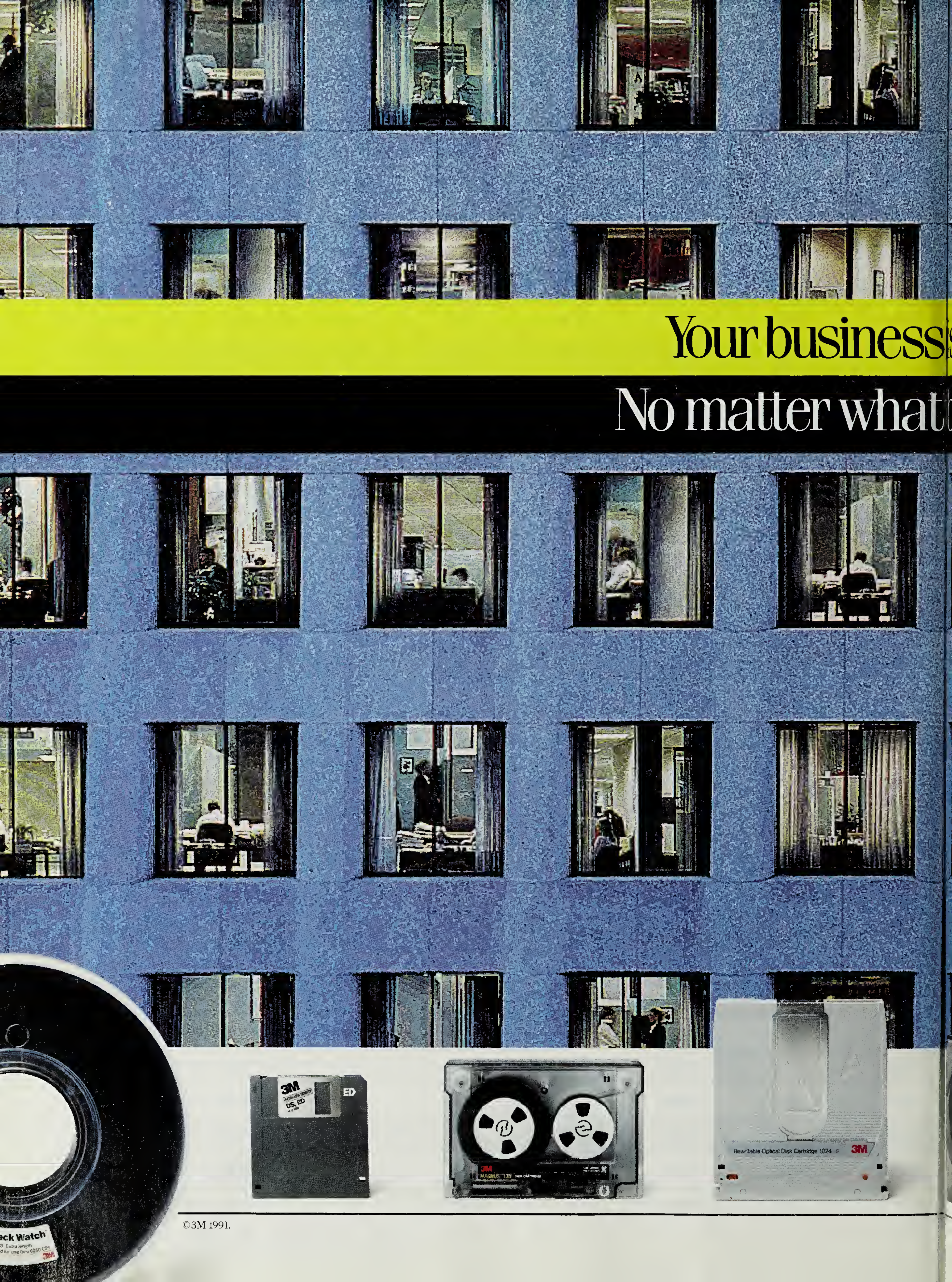
IS budget as % of revenue	Processor market value (millions)	Market value as % of revenue	1991 IS staff	% of IS budget for staff	% of IS budget for training	Total PCs and terminals	PCs/terminals: employees
1.10%	$100	.35%	2,319	46.0%	3.0%	37,000	.76:1
1.31%	$36	.34%	375	39.7%	2.8%	8,907	.51:1
1.84%	$120	.60%	2,200	37.0%	10.0%	32,000	.52:1
1.45%	$27	.19%	1,411	41.6%	1.0%	15,000	.66:1
.93%	$13	.77%	78	25.0%	4.0%	1,225	.35:1
1.74%	$8	.28%	388	43.0%	3.7%	6,475	.64:1
.46%	$106	.27%	NA	38.0%	3.0%	30,985	.57:1
1.01%	$8	.33%	NA	42.0%	4.0%	4,959	.34:1
.91%	$45	.23%	NA	49.0%	4.0%	20,020	.39:1
1.26%	$40	.21%	1,683	40.0%	2.0%	10,000	.37:1
1.19%	$50	.36%	NA	40.1%	3.8%	16,657	.51:1
2.68%	$130	1.66%	1,100	50%	6.0%	14,000	.38:1
1.86%	$75	.71%	1,547	48%	2.4%	23,500	.44:1
.60%	$6	.17%	290	54%	5.0%	9,014	.26:1
.81%	$17	.33%	NA	46%	5.0%	24,995	.84:1
2.48%	$25	1.24%	448	46%	5.6%	8,304	.45:1
1.75%	$26	.87%	NA	50%	4.0%	6,363	.34:1
1.91%	$63	.56%	NA	46%	5.0%	14,958	.18:1
1.20%	$86	2.58%	NA	41%	3.0%	5,162	.26:1
2.56%	$25	.40%	NA	52%	1.0%	15,000	.34:1
1.49%	$45	.25%	1,000	45%	3.0%	27,000	.09:1
1.73%	$50	.88%	NA	48%	4.0%	14,830	.36:1
2.09%	$493	.88%	6,238	30%	2.2%	354,000	.89:1
1.00%	$73	.22%	NA	41%	3.0%	63,700	.19:1
.67%	$80	.25%	1,757	47%	.7%	93,000	.26:1
.76%	$11	.32%	NA	43%	3.0%	2,861	.13:1
.79%	$40	.72%	NA	45%	4.0%	3,868	.08:1

The 100 Most Effective Users of Information Systems

'91 Industry rank	Company, Top IS executive, Title	Total score	Profit growth 1986-1990	Peer rating points	IS budget (millions)
Retailing					
6	**Dillard Department Stores, Inc.** * Malcolm Ritchie, V.P.	46,985	25.4%	8,715	$28
7	**Giant Food, Inc.*** Robert Schoening, Senior V.P.	46,880	26.2%	8,535	$23
8	**Price Co.*** Marci L. Knight, V.P.	46,465	21.3%	8,550	$48
9	**Toys R Us, Inc.*** Dennis Healey, V.P.	46,150	21.7%	8,685	$48
10	**JC Penney Co.** David V. Evans, V.P. and Director	45,665	7.8%	8,595	$171
	Average	47,357	22.6%	8,637	$210
Transportation					
1	**Airborne Freight Corp.** David A. Billings, V.P.	53,145	34.8%	8,535	$52
2	**AMR Corp.** Max D. Hopper, Senior V.P.	50,460	(1.6%)	8,955	$998
3	**Delta Air Lines** * Ron Eubanks, Director	50,450	37.0%	8,820	$189
4	**Union Pacific Corp.*** John Manning, Director	50,290	26.7%	8,610	$200
5	**Alaska Air Group, Inc.*** Leif Haslund, Assistant V.P.	50,155	28.3%	8,535	$40
6	**Unigroup, Inc.*** Bill Troutman, Manager	49,540	22.7%	8,535	$27
7	**Federal Express Corp.** Ron J. Ponder, Senior V.P.	49,455	6.2%	9,000	$234
8	**Worldcorp, Inc.*** Clarence Johnson, Director	48,235	14.3%	8,535	$12
9	**Burlington Northern, Inc.*** Robert M. Brydges, Assistant V.P.	48,155	17.7%	8,550	$242
10	**Roadway Services, Inc.** Jon T. Pavloff, V.P.	48,000	17.2%	8,565	$80
	Average	49,789	20.3%	8,664	$207
Utilities					
1	**MCI Communications Corp.** James L. Zucco Jr., Senior V.P.	57,080	51.3%	8,535	$440
2	**Bell Atlantic Corp.** Joseph T. Ambrozy, V.P.	53,360	4.1%	8,760	$669
3	**AT&T** W.F. Osl Jr., V.P.	52,345	4.9%	8,535	$2,800
4	**Ameritech Corp.** Glen Arnold, V.P.	52,135	2.5%	8,625	$954
5	**GTE Corp.*** Joseph Rasmussen, Director	51,025	7.1%	8,535	$800
6	**Southwestern Bell Corp.*** Ghyrane A. Davidson, V.P.	50,665	1.9%	8,655	$300
7	**Pacificorp** Rodney M. Boucher, CIO	50,080	20.0%	8,535	$74
8	**Northeast Utilities** Tod O. Dixon, V.P.	49,755	(7.8%)	8,610	$73
9	**Carolina Power & Light Co.*** R. Thomas Dwyer, V.P.	49,485	11.4%	8,655	$46
10	**Long Island Lighting Co.*** William Dimoulas, V.P.	49,040	18.8%	8,535	$23
	Average	51,497	11.4%	8,598	$618

* Estimates are from *Computerworld* sources, not the company NA = Not available

IS budget as % of revenue	Processor market value (millions)	Market value as % of revenue	1991 IS staff	% of IS budget for staff	% of IS budget for training	Total PCs and terminals	PCs/terminals: employees
.75%	$12	.33%	NA	43%	3.0%	3,994	.12:1
.71%	$10	.32%	NA	43%	3.0%	3,330	.13:1
.88%	$43	.80%	NA	45%	4.0%	782	.06:1
.87%	$11	.20%	NA	45%	4.0%	3,818	.09:1
.98%	$33	.19%	1,600	40%	.3%	57,000	.29:1
.95%	$81	.42%	NA	41%	2.7%	58,635	.22:1
4.43%	$8	.68%	330	31%	.1%	8,300	.68:1
8.51%	$65	.55%	6,006	29%	.4%	96,211	.94:1
2.20%	$53	.62%	NA	39%	2.0%	35,786	.58:1
2.83%	$45	.64%	NA	45%	3.0%	25,758	.56:1
3.79%	$7	.66%	NA	40%	2.0%	3,024	.40:1
3.45%	$5	.66%	NA	41%	2.0%	353	.38:1
3.33%	$108	1.54%	2,012	48%	2.0%	30,000	.32:1
3.81%	$2	.66%	NA	40%	2.0%	371	.38:1
5.18%	$50	1.06%	NA	39%	2.0%	5,058	.15:1
2.70%	$28	.92%	524	32%	1.0%	14,140	.35:1
4.02%	$37	.81%	NA	38%	1.7%	21,900	.47:1
5.71%	$300	3.90%	1,800	43%	6.0%	34,000	1.39:1
5.44%	$539	4.38%	3,453	36%	5.2%	69,300	.85:1
7.47%	$450	1.20%	18,000	46%	5.0%	290,000	1.06:1
8.95%	$111	1.04%	4,955	28%	3.7%	65,593	.87:1
4.35%	$140	.76%	NA	37%	5.0%	90,000	.58:1
3.29%	$257	2.82%	NA	54%	1.0%	61,700	.93:1
1.94%	$9	.24%	515	32%	4.5%	7,300	.44:1
2.78%	$104	3.98%	406	50%	5.9%	5,974	.73:1
1.76%	$27	1.03%	NA	41%	4.0%	6,000	.50:1
.94%	$30	1.23%	NA	40%	5.0%	1,867	.28:1
4.26%	$97	2.06%	NA	41%	4.5%	63,173	.76%



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Electronic Teamwork Keeps Boeing Growing

BY JANET FIDERIO

Boeing expects that 200 computer-linked design/build squads will reduce rework and errors on its newest jet

Rich Frishman

Boeing's Norm Collins *says full electronic design of its new 777 is the first step in a larger vision: Building all products using 100% digital definition*

The Boeing Co. has given up on making paper airplanes. The world's largest commercial aircraft manufacturer wants to be the first to design an entire aircraft electronically.

More than 200 Boeing design/build teams are working at over 2,000 three-dimensional design terminals, digitally defining every part and system of the Boeing 777 wide-body passenger jet, scheduled for delivery in 1995.

According to Norm Collins, vice president of the Boeing Support Group, the firm's information systems unit, the all-electronic design of its latest aircraft is only the first step in a much larger vision.

"The goal is to build *all* products using 100% digital definition," Collins says. "The geometry for every part, tube and component will be described in electronic terms, so that the drawing can be called up and viewed on-screen — in three dimensions if need be."

Engineers combine individual electronic part designs to check for fit, alignment, accessibility and other issues.

Handling such an ambitious and complex task requires mind-boggling integration and organization. The design/build teams include specialists in structural and electrical design, manufacturing, weight, safety and other areas. Teams are organized in pyramids, with individual component designs at the bottom, subsystems in the middle and the complete integrated 777 at the top. Teams at the top incorporate all subteam efforts.

Boeing, which also produces the 737, 747, 757 and 767, expects that design/build digital definition products will reduce rework and errors by detecting problems before they reach the mock-up stage.

Fortunately, Boeing senior management has shown strong backing for IS groups supporting the effort. Last year, Boeing spent a whopping $1.3 billion on information technology and now boasts an installed base of $1.6 billion worth of minicomputers, mainframes and supercomputers. Among these are more than 10 IBM 3090s and 103,500 personal computers and terminals.

Boeing is also said to have the largest installation of Computer Graphics-Aided 3-D Interactive, or CATIA, terminals in the world. The 2,000 devices, manufactured by the French firm Dassault Electronique SA, reportedly require the power of eight IBM mainframes.

The company, which employs 163,900 people, had net earnings of $1.3 billion in 1990. Sales rose $7 billion, to $27.5 billion, and net income increased by $675 million.

A 30-year Boeing veteran, Collins manages more than 9,000 employees in the Boeing Support Group. The company's internal IS branch supports and maintains all computing hardware, networks, maintenance and consultation efforts for end users in Boeing's three divisions: Commercial Airplane, Defense and Space Systems and Computer Services.

Art Hitsman, president of Boeing Computer Services, also oversees Research and Technology and Boeing Information Services, a systems integration company that specializes in government work. These divisions together employ more than 13,500 IS professionals. The company also has a $50 million outsourcing contract with Digital Equipment Corp.

To keep control, the company centralizes IS and uses standard communications protocols and operating systems. Although primarily an IBM shop, Collins says, Boeing moves information across many different hardware and software platforms. "The systems integration skills of computing and information technology are not unlike the systems integration skills that Boeing engineers, managers and others have always used to put together airplanes," he says.

In this context, Collins sees information technology as a powerful communications tool. "The whole integration task is one of making sure that feedback does take place and that ultimately what you've agreed to will fit together and do the job intended."

2

NORTHROP CORP.

Herb Anderson, *vice president and general manager, information services center*

Information systems at Northrop is more united these days and is helping the Los Angeles-based aerospace firm fly to new heights. A consolidation of IS groups and a centralized data center will help coordinate the work of 30,000 employees in Southern California. The consolidation, Anderson says, has several advantages: It lets Northrop define business processes, standardize on total quality management techniques and support strong teamwork between IS and users — all of which are global corporate standards.

Fueling these efforts is a $285 million IS budget, about 5% of the company's $5.5 billion revenue.

PEER RATINGS

Top five companies according to *Premier 100* peer rating

Company	Points
• The Boeing Co.	8,850
• Martin Marietta Corp.	8,685
• Northrop Corp.	8,625
• Gencorp, Inc.	8,595
• Grumman Corp.	8,580

3

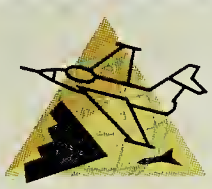
GRUMMAN CORP.

Gerald H. Sandler, *president, data systems and services group*

With high personal computer use, a hefty training budget and a strong quality effort that includes daily service-quality report cards from customers, Grumman is seizing every chance to use information technology.

The $4 billion manufacturer and service provider underwent a major reorganization early in 1991, making IS a major business unit. Bethpage, N.Y.-based Grumman now consists of the Aerospace, Allied (ground transportation), Systems (satellites, surveillance and electrical systems) and Data Systems and Services units.

Grumman's commercial businesses and internal operations complement one another, Sandler says. For instance, Grumman developed secure networks to run data centers for the Pentagon, then transferred that expertise to internal groups to exploit the same tools and techniques.



AEROSPACE

Response base for all charts:
10 *Premier 100* companies from industry group

SUCCESS FACTORS

1. Teamwork and management support
2. Overall technical support and staff
3. Understanding business systems and architectures

BIGGEST CHALLENGES

1. Coping with changing economics
2. Competition from other companies
3. Consolidating operations and integrating systems

CRITICAL TECHNOLOGIES

1. Local-area networks
2. Imaging systems
3. Voice-response systems

4

MARTIN MARIETTA CORP.

Raymond S. Wiltshire, *vice president, computer-aided productivity*

Strong PC and end-user spending, plus the creation of a Computing Standards Laboratory to evaluate microcomputer and local-area network products, prove that the $6.1 billion defense contractor is serious about improving productivity. This year, Martin Marietta in Bethesda, Md., added almost $30 million to its IS budget, for a total of $320 million.

As part of efforts to boost cost-effectiveness, the company in January began to merge its computer contracting and internal IS units with its Electronics and Missiles Group, thereby cutting overhead and approximately 400 jobs.

5

MCDONNELL DOUGLAS CORP.

Ernie Ridenhour, *vice president, information resource management*

Despite the decline in U.S.

Continued on page 28

The IEF™ can help you devel
unprecedented quality, prod

"The IEF is a superior tool for implementing Information Engineering because it integrates the entire process from planning through code generation. We're deploying the IEF throughout the corporation."

David V. Evans
Vice President
Director, Information Systems
J.C. Penney

"Our On-line Banking system has been in production for more than 12 months—500,000 transactions a day—without a single code failure. And we had very few enhancements to do. Our users got what they needed the first time out."

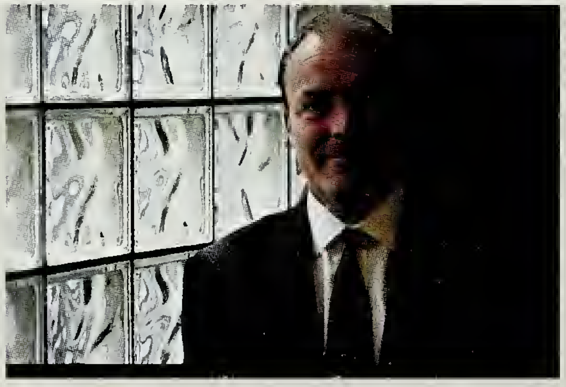
Mark Quinlan
Senior Programmer/Analyst
Huntington National Bank

"To meet the dramatically reduced time-to-market requirements for our products, we need high-quality systems that can be changed fast. That's why we've chosen the IEF as the CASE solution for our entire organization."

John Pajak
Executive Vice President
Mass Mutual Life Insurance

"The strengths of the IEF are clear-cut. One obvious quality advantage is that application changes are made to diagrams, not code. This ensures ongoing integrity —the specification always matches the executing system."

Paul R. Hessinger
Chief Technology Officer
Computer Task Group



"I've seen other CASE tools fail, so I raised the bar high when we evaluated the IEF. It passed with flying colors. I could not be happier with my decision to adopt the IEF company-wide."

John F. Mott
President
AMR Travel Services

"Our users were extremely pleased when we finished our first project—a 60-transaction system—in one-half the budgeted time. We had tried interfaced CASE tools without success. IEF integration makes the difference."

Giorgio Sorani
Division Head – MIS
Lubrizol

"We are using the IEF to develop a new generation of manufacturing systems replacing over 300 existing systems. We estimate that IEF will increase our productivity by between 2-to-1 and 3-to-1 for new systems development.."

Wal Budzynski
Head of Operations, Systems/Computing
Rolls-Royce

"The IEF offers dramatic improvements in productivity, yet it's easy to learn. One example: We trained 23 developers, including 18 new hires, and then completed a large order processing system—300 transactions—all in only 20 months."

Venkat (Vinnie) Tiruviluamala
Director, CPC/CPPC Information Systems
SONY Corporation

"Our first IEF system was completed faster, and with fewer errors, than any system I've ever seen. If I had to go back to the old ways, I'd find another job...outside the DP world. It means that much to me."

Mogens Sorensen
Chief Consultant
Nykredit (Denmark)

op information systems with uctivity and maintainability.

The success of Texas Instruments CASE product is proven—in the field.

Major companies have used TI's CASE product, the Information Engineering Facility™ (IEF™), for everything from rebuilding aging high-maintenance-cost systems to development of new enterprise-wide strategic systems.

Study shows zero code defects.

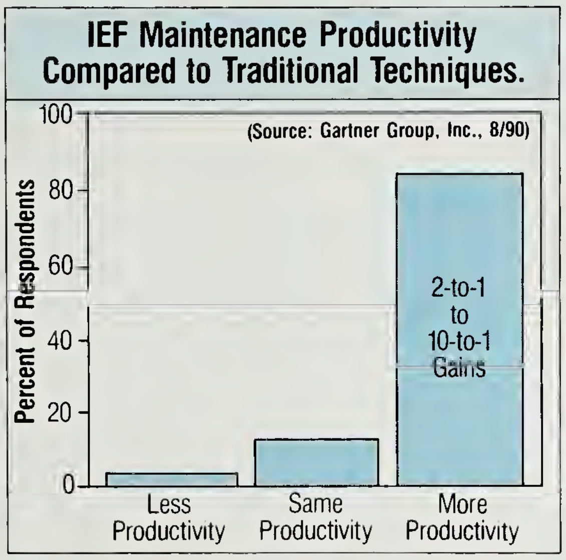
The quality of IEF-developed systems is remarkable. In recent CASE research by The Gartner Group, application developers were asked to report the number of abends they had experienced. (An "abend" is a system failure or "lock-up" caused by code defects.) *IEF developers reported zero defects—not one abend had occurred in IEF-generated code.*

Maintenance productivity gains of up to 10-to-1.

In this same study, developers were asked to compare IEF maintenance productivity with their former methods. Of those responding, *more than 80 percent had experienced gains of from 2-to-1 to 10-to-1.* (See chart.)

Specifications always match the executing application.

With the IEF, application changes are made to diagrams, not code. So, for the life of your system, specifications will always match the executing application. The Gartner Group research showed that *all* IEF users who reported making application changes made *all* changes at the diagram level.



Developers were asked to compare IEF maintenance to former methods. Of those responding, more than 80% reported productivity gains of from 2-to-1 to 10-to-1.

Mainframe applications can be developed and tested on a PC.

With our new OS/2 toolset, you can develop mainframe applications, from analysis through automatic code generation, on your PC. Then, using the IEF's TP monitor simulator and the diagram-level testing feature, you can also test these mainframe applications without ever leaving the PC.

More environmental independence coming soon—develop on PC, generate for DEC/VMS, TANDEM, UNIX.

The IEF has generated applications for IBM mainframe environments (MVS/DB2 under TSO, IMS/DC, and CICS) since early 1988. Soon you'll be able to develop systems in OS/2 and then automatically generate for other platforms. DEC/VMS, TANDEM and UNIX are scheduled for availability in 1991. More will follow. We are committed to increased environmental independence in support of the Open Systems concept.

We are committed to standards.

IEF tools and IEF-generated code will comply with standards as they emerge. We will adhere to CUA standards and to the principles of IBM's AD/Cycle and DEC's COHESION—and we will support Open Systems environments centering around UNIX. In any environment, the COBOL, C and SQL we generate adhere closely to ANSI standards. Our presence on standards committees helps us keep abreast of ANSI and ISO developments affecting the CASE world.

Full-service support.

Of course, our technical support, consultancy, training courses, satellite seminars, and other informational assistance will continue apace. We also offer re-engineering and template services. This full-service support will remain an integral part of the IEF product.

For more information call 800-527-3500 or 214-575-4404.

Or write Texas Instruments,
6550 Chase Oaks Blvd.,
Plano, Texas 75023.

TEXAS INSTRUMENTS

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Continued from page 25

Department of Defense spending, the $16.3 billion St. Louis company is still lining up orders. Its Electronic Systems Co., for example, landed a five-year, $40 million Pentagon contract this spring to install an automated message handling system for the U.S. military intelligence agencies. In August, the firm sold its systems integration business to Electronic Data Systems Corp. in Dallas.

With a 1991 IS budget of $700 million and a 3,700-member IS staff, McDonnell Douglas is ready to tackle its goal of a corporatewide distributed computing environment. The company currently has 70,000 personal computers and terminals for approximately 121,000 employees.

Alan Levenson

A $700 million IS budget *keeps McDonnell Douglas' MD-11 Assembly rolling along*

⑥

LOCKHEED CORP.

Dean O. Allen, *chief information officer and vice president, information and administrative services*

The $9.9 billion Calabasas, Calif., defense contractor downsized several business operations this year, while notching a 16% jump in profits to $335 million.

Generous end-user spending and high PC use (up 16% from last year) show a strong commitment to distributed computing power. The proof: The value of processors in user departments is more than double that of IS groups.

Lockheed generated $271 million in systems integration revenue in 1990, up 18% over that posted in 1989.

⑦

ROCKWELL INTERNATIONAL CORP.

J. F. Sutter, *vice president and general manager*

With high (62%) end-user spending, strong PC use (almost one-third more than last year) and an unwavering commitment to training, El Segundo, Calif.-based Rockwell is racing to take full advantage of PC-based systems and new technologies.

Key among these is an object-oriented expert system called G-Fit, which contains knowledge from Rockwell's space shuttle payload configuration experts. Another is a PC-based computer-aided software engineering development system, called Programmer Workstation, which offloads business applications programming from mainframe to PCs.

Rockwell also elevated the role of IS management, tying it more closely to business operations. The $12.4 billion company posted profits of $624 million in 1990.

⑧

GENCORP, INC.

Linda George, *director of corporate information services*

High PC use, a continued focus on training and an estimated $42 million IS budget have positioned Gencorp, in Fairlawn, Ohio, to accept challenge and implement change. And change is the watchword at Aerojet, the company's aerospace division.

Before 1990, the IS departments of Aerojet's four divisions were decentralized. Now, under central IS leadership, three of them will share business systems for finance and human resources. The management focus has shifted to move IS closer to the needs of business, says division IS director Bob Schoner. Leadership for the new finance and human resources systems, for example, is drawn from user organizations, not from IS, he explains.

⑨

RAYTHEON CO.

Robert B. Almeida, *director of corporate information systems*

The success of Raytheon's Patriot missiles in the Persian Gulf war and a resulting increase in production orders for the missile gave the Lexington, Mass.-based company a shot in the arm last spring. Besides weapons, Raytheon makes appliances and Beech aircraft, builds chemical and power plants and performs geophysical exploration.

Raytheon put some of its profits ($557.3 million in 1990) to good use this year, doubling its IS training budget and increasing spending on its 1,232-member IS staff. Raytheon also clustered smaller IS operations to form larger groups and distributed numerous applications to user organizations via networked servers, terminals and mainframes.

⑩

UNITED TECHNOLOGIES CORP.

Robert Forte, *director, information services*

Moving away from its traditional reliance on big iron, Hartford, Conn.-based United Technologies this year replaced 13 mainframe applications with a PC-based financial system that will be used by 3,000 of the firm's 200,000-plus employees.

UTC's subsidiaries number more than 500 in 100 countries, including Pratt & Whitney, Sikorsky Aircraft and a host of other products, ranging from elevators to space suits. With downsized applications, the $21.8 billion firm should get a lot of bang for its estimated $840 million IS bucks this year.

Former IS chief John Hammitt departed over the summer. Forte is currently the top executive.

Briefs Compiled And Written By
Kathleen Gow

People-powered solutions from BDM

INFORMATION

1. Inform
2. Motion
3. Format
4. Productivity
5. Solutions
6. Networks
7. Planning
8. Research
9. Analysis
10. Modernization
11. Automation
12. Management
13. ADP
14. Command/Control
15. Integration
16. Computers
17. Communications
18. Systems
19. BDM
20. YOU
21.

How Many Words Can You Find In "Information"?

Okay, we took some liberties. But many people don't really know what they should be looking for in information today. Or what it can give them. Or what BDM can give them.

Virtually our entire business revolves around finding better ways to identify, apply, and manage the information you need. Our information scientists, systems engineers, and other information technologists are adept both at uncovering new information and in organizing, storing, presenting, and networking it to multiply its effectiveness and benefit your entire organization.

BDM's information systems expertise spans both large and small systems. Really large ones, too, like the system providing logistics management for the entire U.S. Air Force, and another one that will ultimately serve 15,000 companies and the whole financial community.

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NOTE: No prizes are planned, but if you're intrigued enough to compile and send your list of words in "Information," feel free.

dFacts Are In.

DATABASE COMPARISON TABLE	dBASE IV version 1.1	Paradox version 3.5	FoxPro version 1.02
EASE OF USE			
Control Center organizes data, queries, forms, reports, labels, applications on one screen	**Yes**	**No**	**No**
Create applications *without programming*	**Yes**	**Yes**	**No**
Modern pulldown menus for all Design Tools	**Yes**	**No**	**Limited**
Query by Example (QBE) for easy access to information	**Yes**	**Yes**	**No**
Context specific help by menu item	**Yes**	**No**	**No**
PRODUCTIVITY			
Quick Layout for automatic forms, reports and labels	**Yes**	**No**	**Yes**
Application Generator for quick application development	**Yes**	**Yes**	**No**
Automatic code generation for all Design Tools	**Yes**	**No**	**No**
Automatic maintenance of multiple indexes for ordering data	**Yes**	**No**	**No**
Memo fields for notes, letters, descriptions	**Yes**	**No**	**Yes**
POWER & FLEXIBILITY			
Bold, underline, italic, subscript, superscript text for high impact reports and labels	**Yes**	**No**	**No**
User Defined Functions for extending programming language	**Yes**	**No**	**Yes**
Data input validity checking in forms	**Yes**	**Yes**	**Yes**
Multi-user transaction processing ensures data integrity	**Yes**	**No**	**No**
Number of file formats imported/exported	**7**	**6**	**3**
INDUSTRY STANDARDS			
#1 Selling, #1 Rated multiuser database; over 3 million users (1)(2)	**Yes**	**No**	**No**
Compatible with dBASE III PLUS data and applications	**Yes**	**No**	**Yes**
Compatible versions for DOS, VAX VMS, Macintosh, SunOS and other UNIX platforms (3)	**Yes**	**No**	**Limited**
Structured Query Language (SQL) integrated with programming language	**Yes**	**No**	**No**

(1) dBASE III PLUS and dBASE IV comprise approximately 55% of PC database systems sold (3 times nearest competitor) according to the most recent report by the market research firm Audits & Surveys (Oct. 1990) (2) Software Digest rated dBASE IV #1 among multiuser databases, October 1990 (3) Versions of dBASE IV are shipping for DOS, VAX, and SunOS. Macintosh and other UNIX Platforms are announced.

Based on what our customers tell us, we made a list of some of the most important features to look for in data management software.

Then we compared the new dBASE IV® version 1.1 with two other database products.

As you can see, dBASE IV offers exclusive advantages in many categories.

For instance, only dBASE IV lets you access all its functions from a single screen. Called the Control Center, this screen lets you manage existing data, and create new tables, queries, reports, forms and labels totally without programming.

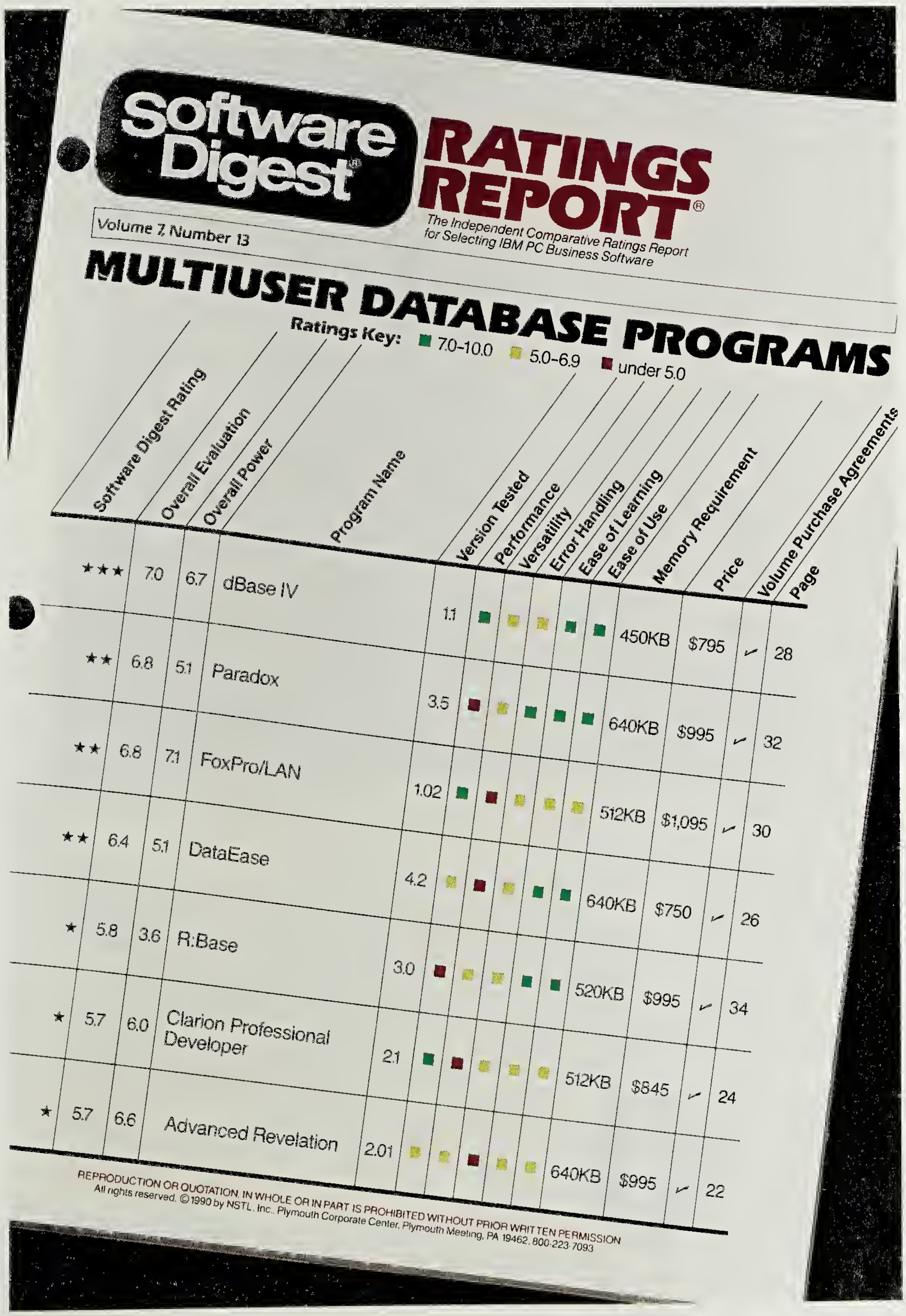
When all the facts are on the table, it's easy to see which database software is best.

Of course we aren't the only ones who have come to this particular conclusion.

Software Digest rates dBASE IV version 1.1 the #1 Multiuser Database (Vol. 7, No. 13, Oct. '90).

Trademark/owner: dBASE IV, Ashton-Tate, Ashton-Tate logo/Ashton-Tate Corp. Other company or product names mentioned may be

dTruth Comes Out.



Software Digest® RATINGS REPORT®

The Independent Comparative Ratings Report for Selecting IBM PC Business Software

Volume 7, Number 13

MULTIUSER DATABASE PROGRAMS

Ratings Key: 🟩 7.0–10.0 🟨 5.0–6.9 🟥 under 5.0

Software Digest Rating	Overall Evaluation	Overall Power	Program Name	Version Tested	Performance	Versatility	Error Handling	Ease of Learning	Ease of Use	Memory Requirement	Price	Volume Purchase Agreements	Page
★★★	7.0	6.7	dBase IV	1.1	🟩	🟨	🟨	🟩	🟩	450KB	$795	✓	28
★★	6.8	5.1	Paradox	3.5	🟥	🟨	🟩	🟩	🟩	640KB	$995	✓	32
★★	6.8	7.1	FoxPro/LAN	1.02	🟩	🟥	🟨	🟨	🟨	512KB	$1,095	✓	30
★★	6.4	5.1	DataEase	4.2	🟨	🟥	🟨	🟩	🟩	640KB	$750	✓	26
★	5.8	3.6	R:Base	3.0	🟥	🟨	🟨	🟩	🟩	520KB	$995	✓	34
★	5.7	6.0	Clarion Professional Developer	2.1	🟩	🟥	🟨	🟨	🟨	512KB	$845	✓	24
★	5.7	6.6	Advanced Revelation	2.01	🟨	🟨	🟥	🟨	🟨	640KB	$995	✓	22

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Perhaps the most independent publication in the industry, *Software Digest* accepts no advertising whatsoever. Corporations pay hundreds of dollars a year to receive their monthly reviews—which are considered highly unbiased and objective. Their exhaustive, 75-page report concludes:

"Among the top ranking programs, dBASE IV (version 1.1) is the most well-rounded, with solid performance, versatility, and usability." Commenting on speed, *Software Digest* points out that "dBASE IV produces all three test reports as fast as or faster than FoxPro/LAN." As for Ease of Use and Ease of Learning, dBASE IV scored in the Excellent Range as many times as any other multiuser database product tested.

For a free evaluation kit, including competitive details and a free demo disk, call toll-free: 1-800-437-4329 ext. 1416. Better yet, call 1-800-2ASHTON to upgrade to the new dBASE IV now.

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Sales Systems Get Personal Care at Helene Curtis

Laptop-toting reps are no powder puffs

BY GLENN RIFKIN

Competing against the likes of Procter & Gamble Co., Unilever Group, Gillette Co., Colgate-Palmolive Co. and Bristol-Myers Squibb Co. in the $9 billion personal care industry forces a company such as Helene Curtis Industries, Inc. to take information systems very seriously.

When Tom Gildea, vice president of business IS, joined Helene Curtis in 1986, he realized that personal care was a sales and marketing business. His job was to empower those groups with technology so they could compete effectively against the giants.

To that end, Gildea and his 150-person IS group used an ample slice of their $22 million budget to create a state-of-the-art sales and marketing system.

Using Metaphor Computer Systems, Inc. database software, Grid Systems Corp. portable personal computers backed up by an IBM 3090 and a Teradata Corp. database system, Gildea constructed a sales information system that not only reports sales but also works as a business development tool.

Kevin Horan

Helene Curtis' Gildea: *'Using technology, sales can go to new levels'*

"Our buyers want to deal with decision makers, not someone who says, 'I'll call back to the home office and get an answer for you tomorrow,' " Gildea says.

Helene Curtis' staff can now do on-the-spot analyses for clients, providing information on competitor's products, how a product will affect income and volume and what it will mean to a customer's business.

The reaction within Helene Curtis, Gildea says, has been outstanding. The sales force, for example, has been able to reorganize in a fashion that allows it to be far more customer-oriented. Now, with the help of technology, sales representatives focus on specific industries rather than on specific territories. Gildea says this makes salespeople more knowledgeable about customers and thus more effective.

"Using technology, sales can go to new levels," Gildea says. "They can aggregate customers by needs or by the businesses they operate in rather than simply by region."

IS "has allowed us to react to a fast-changing marketplace and compete effectively against competitors who are significantly larger, with greater financial resources," adds Ronald J. Gidwitz, chairman and chief executive officer of Helene Curtis. "The results speak for themselves. We've grown faster in the last five years than our competitors."

Helene Curtis is now an $867 million company and is ranked sixth in size in the personal care industry.

Although earnings were off significantly (down 63% to $6.5 million), Gidwitz attributes the slump to high costs associated with several new product introductions and a shift by consumers to value-priced, lower margin products.

Gidwitz, convinced that IS is crucial to Helene Curtis' success, vows to spend "whatever it takes" to continue to improve its technology capabilities.

Customers seem pleased. In 1990, Helene Curtis was vendor of the year for Kmart Corp. and has been Wal-Mart Stores, Inc.'s vendor of the quarter regularly over the past two years. "Those awards are built on a lot of criteria, but it comes down to 'You delivered what you said you would, when you said you would,'" Gildea says.

Despite the current system's success, Gildea, 46, says he wants more. Helene Curtis is working on a prototype pen-based system — due to be in place early next year — that will allow salespeople to coordinate all sales activities in the field.

"People are still using paper-based systems to report," Gildea says. "That can take more than a week or two for all the information to be compiled. As business becomes more and more real time, that really detracts from their effectiveness."

Helene Curtis is already heavily invested in electronic data interchange with its suppliers and customers. Gildea says he expects that trend to grow.

In addition, both customers and suppliers will be linked into Helene Curtis computer systems so that they will be able to monitor product movement at the store level. "They'll be tied into our whole pipeline," Gildea explains.

②

THE HERTZ CORP.

Gary Orrell, *staff vice president, information services*

Information technology helped put Hertz into a profitable driver's seat last year. Earning $89 million in profits required the Park Ridge, N.J.-based Hertz to process 20 million telephone reservations and deliver 12 million car rentals worldwide. Not surprisingly, the IS department had to shift gears quickly to handle operations on that scale.

Hertz's latest challenge is the mammoth task of migrating and centralizing worldwide information systems in the U.S. Aided by a $16 million budget boost, IS has $110 million earmarked for the task. Orrell says the migration will be helped by the fact that Hertz is computer-oriented and computer-experienced. Indeed, some 53% of Hertz's 18,700 employees have access to a PC or terminal.

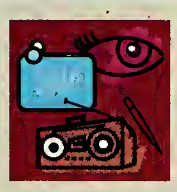
③

READER'S DIGEST ASSOCIATION, INC.

Kenneth A. Nelson, *vice president and director, information services*

Continued profitability is the word at the Reader's Digest Association, which posted a hefty $151 million gain last year and rewarded investors in its first-ever public stock offering. The Pleasantville, N.Y., publisher of the world's most widely read magazine has earmarked $98 million for IS this year. Approximately 43% of that amount will go to the 1,017-member IS staff.

Armed with $8.5 million worth of major processors and nearly 4,300 desktop devices, Reader's Digest is well-equipped to manage and streamline its direct-mail services for a plethora of books, magazines and home entertainment products. The key priority for IS, according to Nelson, is data center consolidation.



CONSUMER PRODUCTS AND SERVICES

Response base for all charts:
10 *Premier 100* companies from industry group

SUCCESS FACTORS

1. Teamwork and management support
2. More user control and involvement
3. Improved customer service

BIGGEST CHALLENGES

1. Meeting the demand for high-quality customer service
2. Coping with changing economics
3. Increasing IS productivity and efficiency

CRITICAL TECHNOLOGIES

1. Local-area networks
2. Expert systems
3. Imaging systems

④

GILLETTE CO.

Herbert Moller, *director, information services*

Keeping pace with the phenomenal sales of Boston-based Gillette's spring-mounted Sensor razor is the top IS priority, Moller says. Gillette, which budgeted an estimated $113 million for IS spending this year, must synchronize the pace of the IS department with the accelerating tempo of business.

"That means designing applications in such an elegant way that you're able to change what you did yesterday with relative ease," Moller explains. Ever at the cutting edge, Gillette is integrating its IS operations for the U.S., Canada and Europe into the company's North Atlantic Group. Gillette recently purchased 300 pen-based computers from Grid Systems Corp.

⑤

THE DUN & BRADSTREET CORP.

Michael S. Field, *president, business information group*

By socking 15% of revenue (about $750 milllion) into IS this year, D&B leaves little doubt that it is banking on information technology. The New York firm is putting its money where its influential mouth is to maintain the largest U.S. marketing and business information database.

The $4.8 billion information services giant must track a staggering array of information that Field says is "far bigger than any relational database constructed today." To maintain this data more effectively, Field has been working to remove mainframes from mainstream tasks. D&B is continuing a multiyear effort to make its files available to its 70,000 employees by using lower cost PC platforms.

⑥

TYCO LABORATORIES, INC.

Louis Chiesa, *vice president, information services and administration*

Decentralization is the IS way of life

at Tyco Labs, a $2.1 billion maker of fire protection and flow-control systems, packaging materials and electrical and electronic components.

Tyco's IS operations are tied chiefly to its chief subsidiary, Grinnell Corp. Committed to IS with a modest budget, Tyco favors distributed computing, tying 70 North American IBM Application System/400 computing locations to a hub IBM 4300 mainframe at its Exeter, N.H., headquarters.

7

ALBERTO-CULVER CO.

Rich Pulsen, *vice president, information services*

Alberto-Culver, based in Melrose Park, Ill., helps millions of consumers around the world look good. The company is the manufacturer of products such as Alberto VO5 hair spray and Sugar Twin sugar substitute. So it's no surprise that the company also does what's needed to keep its IS operations looking sharp.

This year, the company increased sales by $78 million and dutifully put an estimated $7 million back into its IS group.

Because Alberto-Culver stresses management teamwork, an estimated 47% of IS spending goes into IS staffing. Another approximately 2% of the IS budget goes into training.

PEER RATINGS

Top five companies according to *Premier 100* peer rating

Company	Points
• Avon Products, Inc.	8,640
• Clorox Co.	8,640
• The Hertz Corp.	8,565
• Gillette Co.	8,550
• Reader's Digest Association, Inc.	8,550

8

AVON PRODUCTS, INC.

Raymond Perry, *chief information officer*

Automating the purchase and distribution process for the world's largest independent sales force requires more than just another sweet-smelling solution for New York-based Avon.

About 10,000 orders from Avon sales reps are optically read daily. Products are then automatically picked, boxed, bar-coded, sealed and stamped by Avon's computer systems for delivery to customers. The $3.5 billion cosmetics manufacturer recently consolidated six U.S. data centers into a centralized IS department in Rye, N.Y., yielding a savings of $2.7 million.

At first, Perry says, Avon considered outsourcing its IS operation, but then it realized consolidation was the answer for improved internal operations.

9

CLOROX CO.

Raymond Johnson, *vice president, information services*

Computers were little more than a science-fiction fantasy in 1913 when San Francisco-based Clorox — then called Electro-Alkaline Co. — was founded by investors who produced bleach from the salt water ponds around the city. Today, however, the $1.5 billion liquid bleach supplier boasts an estimated $14 million IS budget

The Closer You Look At Software For The AS/400,

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that helps keep the growing company from being muddied in the household products arena. Small chance of that.

Owning a range of products as familiar as Kingsford charcoal and Formula 409, Clorox has developed a scent for successful products. Last year, Clorox bought American Cyanamid Co.'s household products group for $465 million. Moreover, the company has increased its earnings every year since 1980.

⑩

HUMANA, INC.

Fred Pirman, *senior vice president, information services*
Despite being the U.S.' largest publicly owned health-care company and second largest for-profit hospital system, Louisville, Ky.-based Humana is not beyond considering outsourcing.

Pirman has determined that his staff is too busy to handle the huge job of installing, maintaining and providing partial management of local-area networks at Humana's 80-plus hospitals in the U.S., the UK and Switzerland. Although Humana is negotiating with outsourcing vendors, Pirman says, LAN management will be overseen by IS.

Humana also provides health benefit plans for nearly 1 million policyholders.

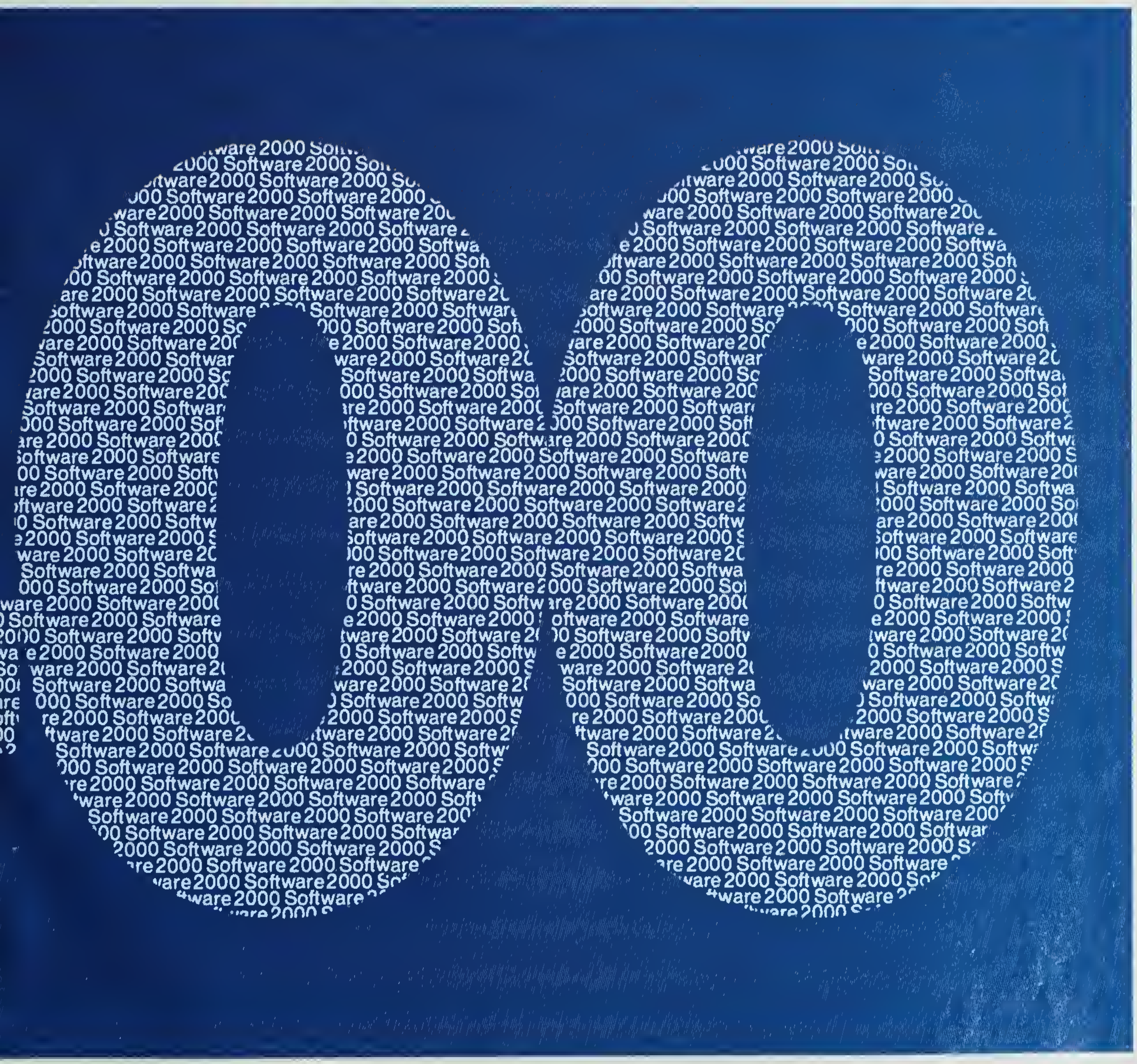
The company's net income has increased steadily from $183 million in 1987 to $309.6 million in 1990, a 21% increase over 1989.

Alan Levenson

Daily optical reading *of 10,000 orders speeds Avon cosmetics to customers*

BRIEFS COMPILED AND WRITTEN BY
JOHN McDONOUGH

The Clearer The Answer Becomes.



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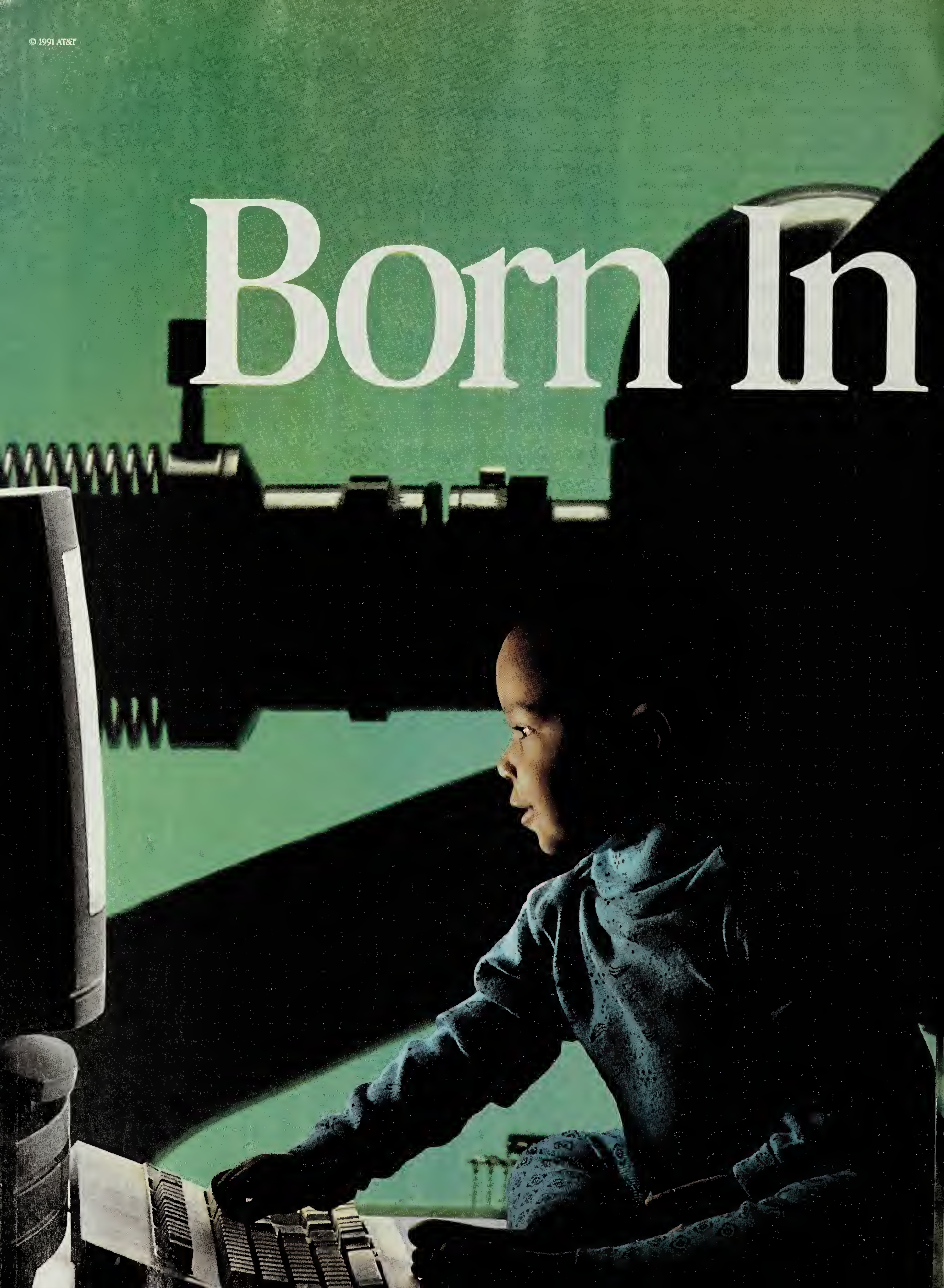

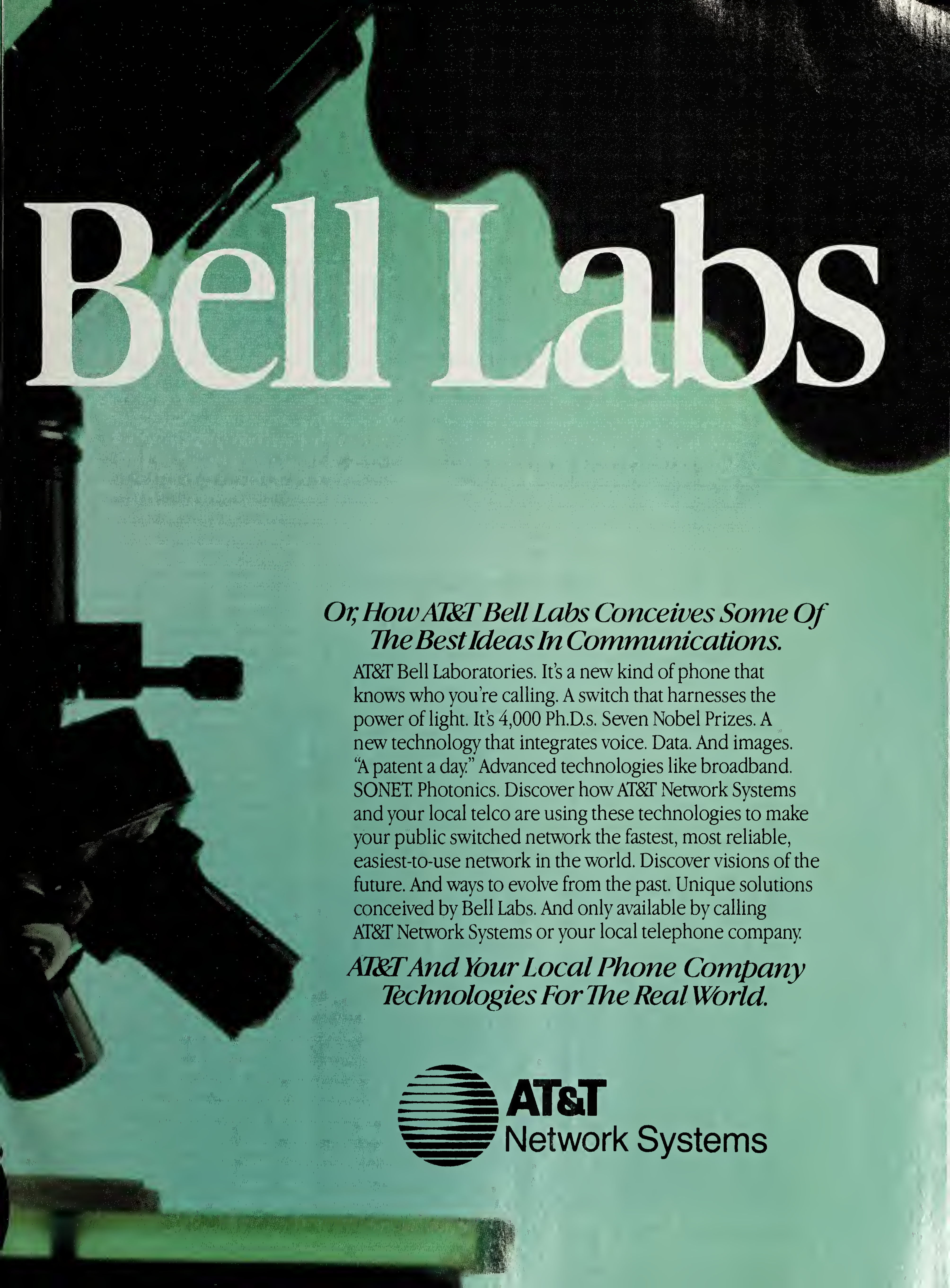

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Tight Fists, Warm Handshakes at Northwestern Mutual

BY AMY BERNSTEIN

Northwestern Mutual Life Insurance Co. is eager to fill the hand that feeds it. Etched into the lobby (and boardroom) walls of the firm's home office in Milwaukee is the company's century-old motto: "To rank first in benefits to policy owners, rather than first in size, and to be preeminently the policy owner's company."

That directive leaves no doubt about the role information systems is expected to play at Northwestern Mutual (assets $31.4 billion), the nation's 10th largest life and disability insurer. The only technology projects and spending funded by top management are those seen to directly benefit policy owners.

"Agents make clear to us what their customers' priorities are," explains Edward A. Flitz, vice president and executive officer of the company's 500-member, centralized IS department. That "very real feedback" from the firm's 7,200 agents directs IS priorities, he says.

Highly active committees and cross-functional teams, which blend operations staff (insurance, investment, marketing and agency) with IS staff, meet frequently to discuss the automation needs of field agents. The vice president of applications sits on the marketing strategy committee.

Franklin McMahon

Northwestern Mutual's Flitz: *IS spending must directly benefit policyholders*

The approach seems to work: Northwestern Mutual is among the strongest firms in the insurance industry. It boasts Triple-A ratings from both Moody's Investors Service and Standard & Poor's Corp., thanks to a decade of steady increases in policyholder dividends, premiums and net investment income. For 1991, the company expects to pay out a record $1.6 billion.

Strong ties between IS and business groups have also made Northwestern Mutual one of the lowest cost producers in the field. Fifteen percent of its annual IS budget is devoted to revamping old systems and software using computer-aided software engineering tools, reusable code and other productivity aids.

That's a good thing because IS is also charged with helping the company stem operating expenses to maximize policy owner dividends. Recent major projects illustrate Northwestern Mutual's corporate philosophy in action:

- The Client Servicing System is the company's core information system. This system provides life, disability and annuity policy data to agents in 106 offices nationwide.

Based on a Supra relational database from Cincom Systems, Inc. and an Amdahl Corp. 5990 mainframe running MVS, the system lets Northwestern Mutual treat each customer as an individual, not simply as a string of unconnected policies, IS Director

Armin Gumerman says.

Field agents benefit from the integrated approach, according to Gumerman, because they can simultaneously download and manipulate multiple policies. Access is via dial-up or leased lines and Novell, Inc. local-area networks or the company's Link III Life Insurance Network. The latter is a Northern Telecom, Inc. X.25 packet-switching network with 10 nodes.

Two key indicators show that the system works: Most policyholders keep their insurance, and life insurance jumped 12% to $224 billion in 1990.

- Another good example of a customer-oriented system that also improves internal efficiency is Northwestern Mutual's new Underwriters' Workbench. Using a mix of expert system technologies, including proprietary LISP machines and IBM Personal Computers, Workbench helps guide underwriters and administrators through the policy-writing and account management process.

Eventually, the Amdahl-hosted cooperative processing system will be expanded to include compact disc/read-only memory, voice technology and more, Gumerman says.

"The integration of multiple technologies is our way of doing business for the '90s," he says.

- Northwestern Mutual's drive to provide a mix of technologies to agents and customers while keeping profitability high led to an innovative deal with MCI Communications Corp. The insurer became one of the first companies to locate its packet switches at MCI facilities. Northwestern Mutual officials say the deal has strengthened links among headquarters, agents and customers.

Besides these efforts, at least five small-scale redesign projects will be completed in 1991 with no increase in staff, Flitz says.

Through it all, Northwestern Mutual remains faithful to its credo of never letting anything come between itself and its customers — not even technology.

Agents are discouraged from using laptop computers in favor of the corporate network. The reason? Portables are thought to interfere with agent/customer relations.

2

AETNA LIFE & CASUALTY CO.

John D. Loewenberg, *senior vice president*

Some of the insurance industry's mighty have fallen, but not Aetna Life & Casualty. The Hartford, Conn., company remains the fourth-largest U.S. insurer, with 1990 revenue of $19 billion. In 1991, some $600 million will go to IS plus $105 million to telecommunications.

Last year, after acquiring Partners National Health Plans, a health maintenance organization, Aetna trimmed its work force and consolidated both existing and acquired IS functions.

The newly slimmed IS staff of 4,900 serves a user community of 47,000. Most employees have their own PCs or terminals — a big switch from last year, when only half had desktop machines.

3

MASSACHUSETTS MUTUAL LIFE INSURANCE CO.

John J. Pajak, *executive vice president*

Twenty years ago, Mass Mutual in Springfield, Mass., linked independent agents with a computer network, long before competitors did so. Today, agents at the $6.7 billion firm still use the oft-updated Intercom system.

PEER RATINGS

Top five companies according to *Premier 100* peer rating

Company	Points
• Banc One Corp.	8,985
• Northwestern Mutual Life Insurance Co.	8,700
• Massachusetts Mutual Life Insurance Co.	8,685
• Mellon Bank Corp.	8,685
• Metropolitan Life Insurance Co.	8,670

FINANCIAL SERVICES

Response base for all charts:
10 *Premier 100* companies from industry group

SUCCESS FACTORS

1. Teamwork and management support
2. Accessibility of information and networks
3. Overall technical support and staff

BIGGEST CHALLENGES

1. Growing and allowing for new technology
2. Meeting the demand for high-quality customer service
3. Competition from other companies

CRITICAL TECHNOLOGIES

1. Imaging systems
2. Voice-response systems
3. Expert systems

Supported by a $78 million budget, Mass Mutual's IS staff of 873 is helping introduce a new life and health insurance claims-processing system. Also being rolled out is a Strategic Investment System that will support the firm's securities and real estate businesses. "We're fortunate to have computer-literate end users," says Peter Deboul, senior vice president.

4

MELLON BANK CORP.

David A. Moore, *senior vice president, information processing*

Acquisition. Consolidation. Landing a key new client. Quality improvement. It's all in a year's work for the 1,511 IS professionals at Mellon Bank. When the nation's 18th largest commercial bank acquired Philadelphia Savings Fund Society, IS consolidated 54 branches into Mellon's Philadelphia data center. Soon after, Mellon agreed to handle the entire data processing operations of Dollar Dry Dock Bank. Mellon's IS group created a hybrid system that retained the unique features of Dry Dock's software while standardizing operations.

A corporatewide quality initiative spurred Mellon's IS operations to search for ways to improve efficiency and manage expenses. Supporting such efforts is a $194 million IS budget.

Continued on page 42

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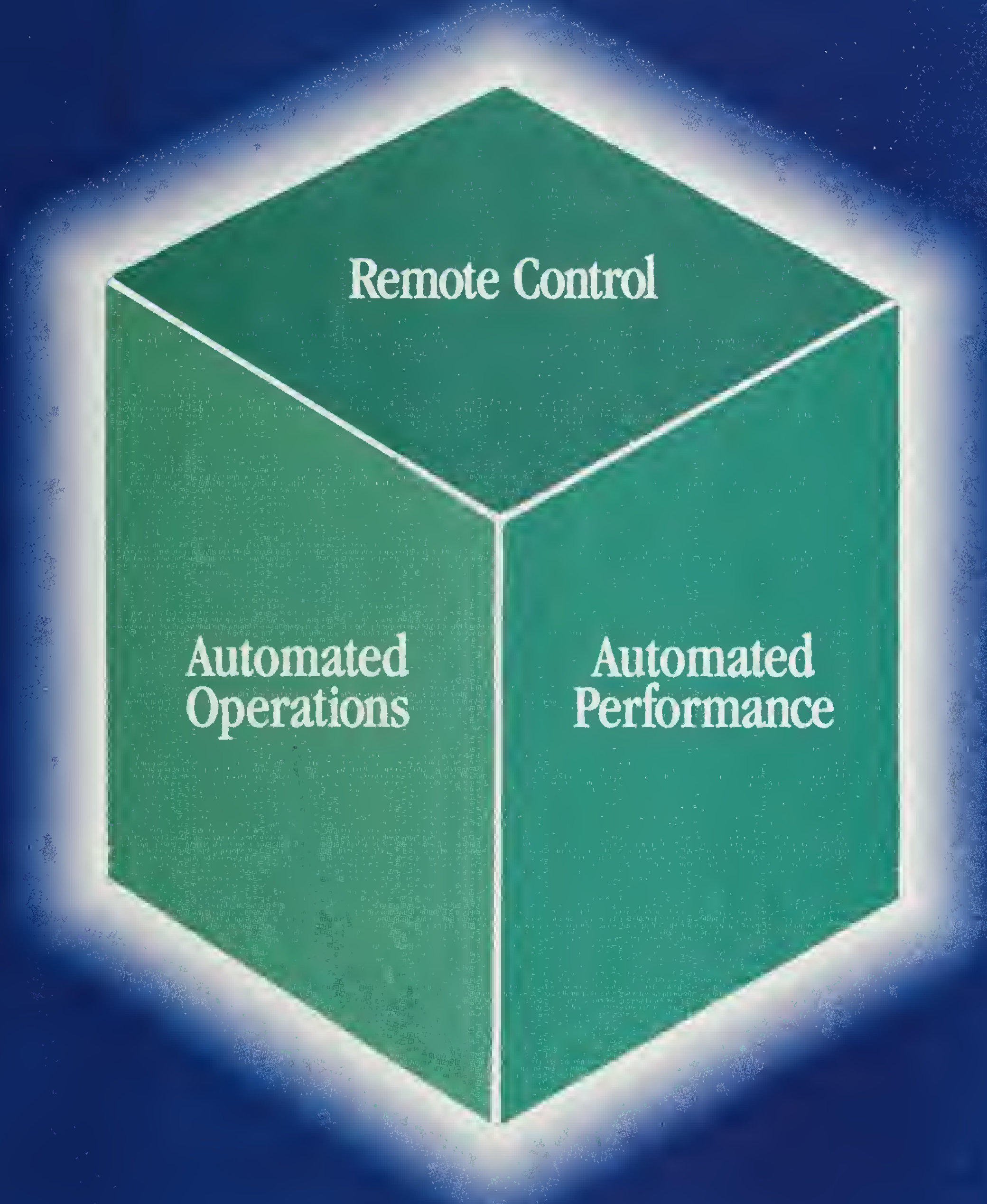

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Continued from page 39

⑤

PRIMERICA CORP.

Ed Sherin, *senior vice president and chief information officer*
Consolidating Primerica's data center and improving coordination among its subsidiaries gave the nation's 20th largest diversified financial services company access to more accurate data than ever before possible. Networks are a top priority. Company officials say spending is vital to get Smith Barney, Harris Upham & Co. and Fingerhut Corp. up-to-date information. Primerica's 1,424-person IS team provides service to nearly 24,000 employees. New York-based Primerica has earmarked $40 million for telecommunications, on top of the $232 million IS budget.

Andy Freeberg

Many Wall Street *firms are increasing technology spending*

⑥

PRINCIPAL MUTUAL LIFE INSURANCE CO.

Robert W. Delaney, *vice president, IS director*
Principal, an A+-rated insurer based in Des Moines, Iowa, boosted IS spending by $19 million in 1991 to support expansion of its group life and health business. This summer, 30 IS professionals joined the development staff for the business unit that will design, market and process employee benefits for the $8.6 billion Principal's customer companies. "We focus on the business plan and develop technology to support it," says Delaney, who heads an IS staff of more than 750 and a $64 million budget. To make executives aware of the IS impact on the $8.6 billion corporation's well-being, Delaney and his team presented Principal's contingency planning program from the business units' viewpoint, gaining widespread support.

⑦

BEAR, STEARNS & CO.

W. Ben Kuenemann, *senior managing director, information services*
Who says things are slow on Wall Street? Bear, Stearns' IS professionals tackled three major projects during this past year, each of which had a big effect on the $2.3 billion New York-based investment banking and brokerage firm.

First, the 421-person IS staff "insourced" the company's back-office processing from Automated Data Processing to its own data center. Second, the team completed a conversion of a mainframe-based Unix trading application to Unix-based workstations. Third, the IS team built a system to handle on-line trading and trade reporting for Bear, Stearns' specialist clearance business. The investment needed to fuel such projects boosted IS spending to $100 million, up from $59 million last year. End users at Bear, Stearns spent almost another $30 million on technology — a figure unmatched by competitors.

⑧

METROPOLITAN LIFE INSURANCE CO.

Daniel J. Cavanagh, *CIO*
Met Life's marriage of agents and automation helped produce record-breaking life insurance sales of $29 billion in 1990. The performance pushed the nation's second-largest insurance company ahead of Prudential Insurance Company of America in total face value of life insurance policies in force.

To support such growth, Met Life's IS team is planning a gradual shift away from Bull HN Information Systems, Inc.'s DPS 6 minicomputers, which agents access using Zenith Data Systems laptops. The New York-based financial giant will move toward local-area networks and intelligent workstations using Bull HN as a systems integrator.

The new systems will manage information for the insurance, real estate, finance and investment, health care and hotel businesses at the company.

To handle these jobs, Met Life has earmarked $250 million for IS. The company is already heavily computerized: Every one of Met Life's 43,000 employees has individual access to a terminal or PC.

⑨

U.S. BANCORP, INC.

Tim Meier, *manager, information services*
U.S. Bancorp in Portland, Ore., is aggressively adding to its general banking, security trading, mortgage banking, consumer financing and equipment leasing interests. Last year, the firm acquired National Machine Tool Corp., formerly a subsidiary of Summit Bancorp, and added several Northern California banks' branches to its network.

Like many acquisitive companies, U.S. Bancorp's IS group consolidated the data processing functions of its new companies to boost efficiency and trim costs.

"We follow a course of cautious aggressiveness in pursuing business and in applying technology," says Eugene Lukac, manager of IS. The tactic has paid off. In 1990, net income rose to $183 million, up from $151 million.

⑩

BANC ONE CORP.

David Van Lear, *president, Services Corp.*
Columbus, Ohio-based Banc One has grown steadily — it's now the 26th largest U.S. commercial bank — through savvy acquisitions, prudent management and service to the lucrative banking "middle market." Such moves have helped Banc One withstand the go-go years that left some competitors under government care.

Recent acquisitions not only swelled Banc One's revenue and profits but also boosted IS staffing, while doubling the ratio of PCs and terminals to employees. Now, 80% of a $258 million IS budget goes to a staff of 1,450; 12% supports IS training. Total processor value is $52 million, the second highest among financial services companies surveyed.

BRIEFS COMPILED AND WRITTEN
BY JILL VITIELLO

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S. Robert Levine
President & CEO

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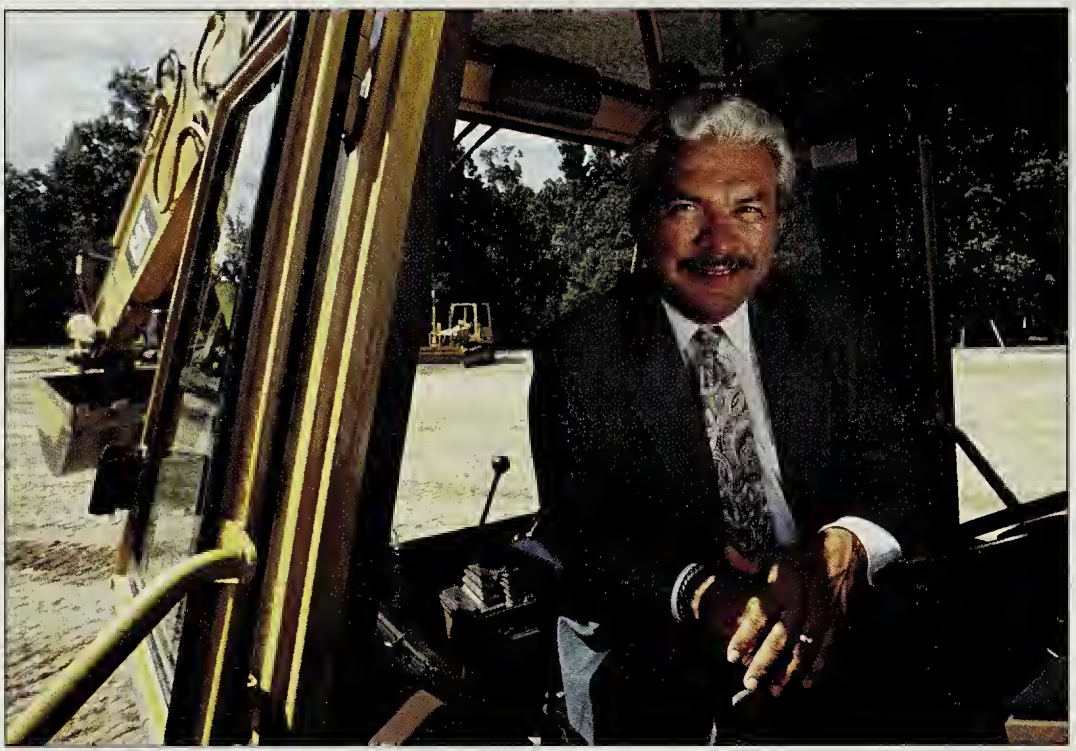

Caterpillar's Nack: *Worldwide EDI has already saved the company $10 million*

David Joel

Caterpillar's Earth-Shaking Reorganization

BY JANET MASON

The world's leading maker of earth-moving equipment is digging in to meet adversity and big change.

Faced with a projected $90 million loss for 1991, formidable Japanese competition, the threat of a crippling labor strike and the aftermath of an industrial espionage scandal, an embattled but unbowed Caterpillar, Inc. is reshaping its information systems strategy as part of an ongoing, companywide plan to slash $2.2 billion in expenses.

Caterpillar officials say reorganization will allow the $11.4 billion worldwide business to be driven more by the company's 17 operating units.

"The change allows us to provide support for all aspects of the product line," says Dale Fieldcamp, director of corporate information services at the Peoria, Ill., maker of tractors, construction machinery and engines.

Caterpillar is now gearing up to protect and expand its overseas presence with swifter, broader IS support

So far, 800 of Caterpillar's 2,800 IS staff members have been transplanted from 36 worldwide plant locations to the new business units. The headquarters IS staff, which sets companywide standards, consists of 1,200 employees.

Analysts say the shuffling and cost-cutting, which began in the mid-1980s, are painful but necessary and will help Caterpillar stay competitive against archrival Komatsu Ltd. and others.

Despite record sales last year, Caterpillar's profits slipped to $210 million, down from $497 million in 1989. Overseas sales, which account for three-fifths of the firm's revenue, are rising, thanks to a strong demand outside of the U.S. for housing, construction and other development. In addition, Caterpillar has been gearing up to protect and expand its presence abroad with broader IS support.

#1

Caterpillar's new decentralized IS structure will give users faster and wider access to information, Fieldcamp says.

Although Caterpillar's profit picture appeared dreary last year, it didn't mean the company was stuck in the mud. The rough economic road has not stopped the company from plowing healthy sums into information systems. Corporate spending for IS alone will hit $300 million this year.

Continued on page 46

THINK OF IT
AS YOUR
EMPLOYEES
WORKING 50%
FASTER.

Continued from page 44

To support growing overseas sales, Caterpillar's IS department has built a worldwide X.25 electronic data interchange (EDI) network that links more than 950 of the company's largest suppliers. Savings to date total $10 million, according to John Nack, manager of the Processing Network Division.

Decentralizing has also sped up applications development, Fieldcamp says. Applications that once languished in development for several years are now in end users' hands within six months. "Sixty percent of our development is now in 'fast payout' systems rather than in traditional, massive systems," Fieldcamp says.

User-defined

A good example of these modular systems is Caterpillar's dealer application, which links 130 dealers via on-site satellite dishes. Fieldcamp explains: "Instead of waiting two years for the entire system, end users can use each module as it is finished." Such applications are developed by teams of six IS staff members and end users.

Because end users help develop as well as use the system, Fieldcamp says, they get an immediate feel for how the subsequent parts of the application can be improved. And because end users know best what information they need and how they have to use it, they are put in charge of these small systems development teams.

"Users," Fieldcamp says, "should always feel that it's their project, their objectives and their goals, and it's not an 'IS' project." The balance between IS and the end user is a delicate one, but it's steady and strong, he adds.

Of course, the corporate mission requires that everything start with the 17 business units without diminishing the power of the corporate whole.

At the corporate level, deployment of satellite-based communications technology has helped trim years off the product development cycle.

Before the network, product developers had to travel to meetings around the world to work together. Now, Fieldcamp says, a single step in the process that once took three months can be done overnight.

Engineers, manufacturers and supply people in several locations — including the U.S., Japan and Europe — can all work on one image at the same time, thanks to improvements in the Caterpillar network that now allow it to handle large, complex engineering drawings.

PEER RATINGS

Top five companies according to *Premier 100* peer rating

Company	Points
• Deere & Co.	8,760
• Black & Decker Corp.	8,745
• Caterpillar, Inc.	8,730
• The Timken Co.	8,640
• Harnischfeger Industries, Inc.	8,580

The network also gained 100 connections last year, joining Caterpillar plants and 22 distribution sites in 10 countries and 217 dealers over a fiber-optic telecommunications link. Suddenly, Fieldcamp says, Caterpillar's new IS structure boasts formidable flexibility.

This new level of flexibility and communication gives Caterpillar IS groups the power they need to make swift, accurate decisions.

Now business-unit IS groups can work with corporate IS to decide the most effective way to handle a job: by work unit, corporate IS or with an outside party.

Cost-cutting will continue at Caterpillar, but its technology growth shows no sign of slowing in the coming year.

Finishing touches are now being put on the satellite network. According to Fieldcamp, most U.S. facilities are completed, and the company is now looking at Europe and the Far East.

INDUSTRIAL PRODUCTS

Response base for all charts:
10 *Premier 100* companies from industry group

SUCCESS FACTORS

1. More user control and involvement
2. Teamwork and management support
3. Improved customer service

BIGGEST CHALLENGES

1. Coping with changing economics
2. Meeting the demand for high-quality customer service
3. Consolidating operations and integrating systems

CRITICAL TECHNOLOGIES

1. Local-area networks
2. Expert systems
3. Imaging systems

Caterpillar plans to expand EDI onto its internal IBM Systems Network Architecture network by year's end, and work continues on the company's $2.3 billion "Plant With a Future" project to modernize and computerize its 32 facilities. The project is scheduled to be completed next year.

It's clear that Caterpillar is committed to its long-term IS strategy. Among the most vertically integrated companies in the industry, Caterpillar has the technology resources to change and adapt as it chooses.

The burden on IS at Caterpillar is great, considering the level of vertical integration, but it's a burden Fieldcamp accepts. He says he believes the new structure will continue to work just fine.

"Most IS employees," he says, "feel more in charge now."

②

DEERE & CO.

Paul F. Ohman, *vice president, engineering and information technology*

Deere, the world's largest manufacturer of farm equipment, has sown stability in its IS department. About 42% of its $189 million IS budget supports a 1,400-member staff. This year a big push to install personal computers and terminals boosted the companywide number of workers with desktop machines from one-fifth to one-half.

Even so, a wilting economy and thorny competition have persuaded Moline, Ill.-based Deere to prune parts of IS and invest in its IS future. Deere Technology Services, which once outsourced its IS operations, will now serve only Deere & Co.

③

PACCAR, INC.

Bruce Carlson, *general manager*

Paccar, a leading manufacturer of heavy-duty trucks, has its wheels of progress rolling in the right direction. This year, the Bellevue, Wash., company jumped six spots in the *Computerworld Premier 100*, with an estimated 2.5% ratio of IS spending to revenue.

The company's PCs and terminals amount to nearly one for every three employees. About 4% of the IS budget goes for training. EDI is also a key part of Paccar's IS strategy.

Efforts to expand the technology for

Continued on page 48

THINK OF IT AS A FREE MAINFRAME.

Continued from page 46

better shipments and inventory control will continue in 1991.

④

THE TIMKEN CO.

Robert Leibensterger, *vice president, technology*

A slag-heap economy did not stop the Canton, Ohio, maker of antifriction bearings and alloy steels from continuing plans to install a new computerized customer service system. The company is also continuing to develop computer-driven, just-in-time manufacturing for its overseas plants.

To meet these goals, Timken uses an estimated $37 million of its $1.7 billion revenue for IS.

About 41% goes to the IS staff and 5% to training, reflecting the company's view that a strong blend of technology and human resources is essential for worldwide competitiveness.

Alan Levenson

A $300 million IS budget *keeps Caterpillar equipment rolling on*

⑤

CLARK EQUIPMENT CO.

Foster Martin, *director, computer operations, North America*

During 1990, Clark slimmed down its business units, scheduled brief plant shutdowns, decreased outsourcing and limited hiring of both temporary and permanent workers. At the same time, Clark's IS department moved to boost worker productivity by increasing PC and terminal use.

The $1.5 billion company, headquartered in South Bend, Ind., focuses on distributing forklift trucks, transmissions and construction machinery.

⑥

BLACK & DECKER CORP.

Sidney Diamond, *vice president, worldwide information services*

Black & Decker undertook some major renovations of its own this year. The world's largest maker of power tools and home improvement products shaved its IS budget from $150 million to $85 million, divested businesses and consolidated major data centers.

What's more, the 81-year-old firm, located in Towson, Md., also outsourced data center operations, printing, microfiche and data entry in an effort to become more cost-efficient. Despite the cuts, spending on the 650-person IS staff held steady at one-third of the IS budget.

⑦

DRESSER INDUSTRIES, INC.

Henry Paulsen, *director of information services*

Paulsen is no stranger to level funding. His current estimated IS budget is the same as 1990. But like last year, a hefty 50% of that amount goes to IS staffing. The people focus and flat budgets seem to be paying off for the Dallas-based maker of oil industry equipment: Profits hit $184 million last year on revenue of $4.53 billion.

Dresser manufactures downstream oil refining equipment and upstream exploration and production products. The company's M-I drilling fluids lead the industry.

⑧

GREAT AMERICAN MANAGEMENT & INVESTMENT, INC.

Michael J. Corcoran, *manager, data processing*

Chicago-based Great American likes diversity. With investments in manufacturing, agricultural fertilizers and chemicals, real estate and financial services, the company has acquired 25 businesses in the past decade alone. Apparently, variety pays: Estimated 1990 revenue totaled $2.4 billion.

Keeping its finger in so many pies requires Great American to tend its IS staff well, with a budget of an estimated $46 million that includes 40% for staffing.

⑨

YORK HOLDINGS CORP.

Orville N. Trembly, *director, information services*

Business at York is running hot and cold, and that suits the maker of air conditioners, heaters and refrigeration products just fine. Revenue for the York, Pa.-based company, which was spun off by Borg-Warner Corp. in 1987, hit $1.4 billion last year.

That figure included an estimated $30 million for IS and 4% for IS training.

⑩

HARNISCHFEGER INDUSTRIES, INC.

Sean Bradley, *director, data center*

Harnischfeger Industries is no slouch at the art of juggling. During 1991, the Milwaukee-based holding company successfully balanced Beloit Corp., Harnischfeger Corp., Harnischfeger Engineers, Inc. and Syscon Corp.

With 1990 revenue topping $1.8 billion, Harnischfeger relies on the stability within its technological, engineering, customer service and IS departments. Like many of its competitors, Harnischfeger held IS spending in 1991 at an estimated $25 million. Staff spending also held steady at 46%.

The company spends an estimated 3.7% of its IS budget on training.

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BY LISA DAVIDSON

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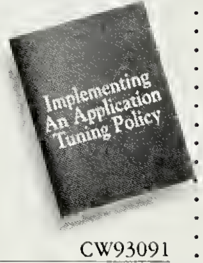

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IS Helps 3M Stick Together

BY ALAN RADDING

3M's Kuhrmeyer: *'We plan IS for worldwide service'*

Alvis Upitis

How do you unite a company that has more than 60 business units in 52 countries and 194,000 products — ranging from Scotch tape and roofing materials to electronic imaging systems — into a single, global organization? For St. Paul, Minn.-based 3M Co., there is only one answer: information technology.

A 3,200-member information systems staff plays a leading role in creating the technological backbone needed to link the sprawling, diverse empire of the 89-year-old Minnesota Mining & Manufacturing Co.

"We plan IS for worldwide service," says Carl A. Kuhrmeyer, vice president of administration and chief information officer. That makes good sense: Some 49% of 3M's $13 billion in 1990 sales and 44% of its 89,600 employees work outside the U.S.

The technology bridge between these far-flung divisions is 3Mnet, a custom combination of private X.25 data networks, Systems Network Architecture networks and Integrated Services Digital Network (ISDN) voice networks. "We don't have communication in every country yet," Kuhrmeyer says, "but we can at least make contact and send messages."

Most remote locations have 9.6K bit/sec. or faster network service; a redundant 64K bit/sec. network links 3M's larger facilities. In the U.S. and Europe, the network is fully redundant; corporate IS is currently extending that capability to Japan.

The key to making a global IS shop work, Kuhrmeyer says, is flexible planning. Using a five-year horizon, 3M's corporate and divisional IS groups develop strategic goals. These are then reviewed by the IS staff at headquarters to "see how they fit together," he explains.

Based on the results, the company pursues a two-pronged strategy. The first focus is on building worldwide systems, such as 3Mnet, to serve the entire company. The second is allowing individual IS groups to use specialized systems, such as marketing and distribution applications, for their own needs.

To meet these goals, 3M has set up a hybrid IS structure. Systems such as 3Mnet, corporate databases, human resources and manufacturing remain under the control of a centralized IS department. The group is creating standardized corporate databases to ease information flow throughout the organization, for example.

Decentralized IS units are located in most individual business units. When a local IS group develops a particularly effective system, such as a computer-aided design and manufacturing application, corporate IS expands use of the system to the rest of the company.

To support these efforts and Challenge 95, a corporate productivity program, 3M runs a mix of systems that includes everything from IBM mainframes to Apple Computer, Inc. Macintoshes.

Despite early, large-scale adoption of ISDN, the company generally avoids pioneering technology. "We're on the trailing portion of the leading edge," Kuhrmeyer says.

3M recently implemented a computerized document management system in its Product Information Center. The full-text imaging system provides customers with speedy answers to questions about company products.

Besides continuing work on its current initiatives, 3M is taking an active role in promoting open computing. "Vendors pay lip service to standardization," Kuhrmeyer says, "but they are still looking at what's in it for them."

②

MEAD CORP.

John Langenbahn, *vice president*

Networking has come to play a key role at this Dayton, Ohio-based paper manufacturer-turned-electronic publisher. Mead has taken a page from the experiences of its Lexis and Nexis on-line information services and applied it to the core paper business.

Near-term goals include completion of a global ISDN network, which will offer video teleconferencing and messaging both inside and outside the company. Also under way is an ambitious project to replace electronic mail with video mail. Another key strategy treats the data center as a telecommunications node. The $4.8 billion company has also merged its IS and telecommunications staffs.

③

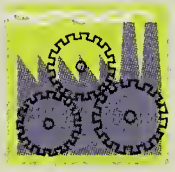
EASTMAN KODAK CO.

Katherine M. Hudson, *vice president and director, corporate information services*

After stunning the IS world with its 1989 landmark outsourcing deals, what could $19 billion Kodak do for an encore? Continue downsizing, courtesy of new state-of-the-art data centers, migrate IS staff members to business units and phase out all proprietary networks by 1996.

By that time, Kodak will have an Open Systems Interconnect backbone linking its Rochester, N.Y., headquarters with two new overseas data centers.

Kodak is also re-engineering business processes using standardized, globally integrated applications based on interactive SQL relational databases. Under Chief Executive Officer Kay Whitmore, Kodak is also regrouping around its core imaging businesses. The company is a founding member of the National Storage Industry Consortium.



MANUFACTURING

Response base for all charts:
10 *Premier 100* companies from industry group

SUCCESS FACTORS

1. Teamwork and management support
2. Understanding business systems and architectures
3. Accessibility of information and networks

BIGGEST CHALLENGES

1. Coping with changing economics
2. Competition from other companies
3. Consolidating operations and integrating systems

CRITICAL TECHNOLOGIES

1. Imaging systems
2. Expert systems
3. Local-area networks

④

GENERAL ELECTRIC CO.

Edward Skiko, *vice president, corporate information technology*

GE's unrelenting quest for black ink has made it the world's third most profitable corporation. IS operations throughout Fairfield, Conn.-based GE's scattered business units have responded to corporate's profitability dictums with initiatives ranging from open systems migrations to high-speed cooperative processing.

PEER RATINGS

Top five companies according to *Premier 100* peer rating

Company	Points
• 3M Co.	8,850
• Mead Corp.	8,805
• Inland Steel Industries, Inc.	8,640
• Eastman Kodak Co.	8,610
• General Electric Co.	8,580

For example, GE's $5 billion aerospace unit began migrating to a client/server Unix network based on Sun Microsystems, Inc. workstations. As part of the migration, the unit ordered $10 million worth of computer-aided software engineering (CASE) tools from Cadre Technologies, Inc., the vendor's largest such order to date.

Meanwhile, GE's corporate vehicle-leasing subsidiary boosted profitability after installing 17 high-speed Token Ring networks linking 700 IBM Personal System/2s to an IBM host. With data instantly accessible, the unit was able to expand its fleet by 20% without adding new personnel.

⑤

LAFARGE CORP.

Brian Powell, *director, information services (North America)*

The $1.6 billion supplier of cement and construction materials is fighting the real estate downturn by using information technology to boost customer service. Reston, Va.-based Lafarge recently finished a three-year effort to develop a decentralized sales and marketing information system based on Digital Equipment Corp.'s VAX and RDB as well as Cognos

Corp.'s Powerhouse.

Developing the custom system meant swiftly mastering leading-edge CASE and fourth-generation language (4GL) technologies, Powell explains.

"We invested heavily in developing our own RDB and Powerhouse experts," he says.

⑥

LORAL CORP.

Hazeljean Adams, *manager, information resource management*
Although the defense industry is downsizing, government reporting requirements are mushrooming. Despite cutting its IS budget by almost 4%, the New York firm nonetheless tackled several key projects: It implemented a U.S. Department of Defense-required cost and project management system, used the Mapper 4GL from Unisys Corp. to weed out overlapping databases and began migrating away from an obsolete Unisys-based manufacturing resource planning system. According to Adams, the strategy will be to adopt a new commercial package with as few modifications as possible.

⑦

TEMPLE-INLAND, INC.

James Thomas, *director, IS*
Training plays a big role in Diboll, Texas-based Temple-Inland's IS migration plans. Consuming an estimated 7% of its IS budget, the $2.4 billion company's training expenses are proportionally the highest in the *Premier 100* manufacturing's Top 10. Besides technical training for both IS staff members and users, softer areas such as communications skills are also taught.

Much emphasis is also placed on gaining user buy-in. The strategy played a key role in the corporate acceptance of IBM's Officevision, whose champions were business unit-level vice presidents.

To minimize bugs, the firm's IS group tries to run uncustomized versions of vendor software packages whenever possible.

Such strategies have been crucial to a three-year effort to migrate from batch to interactive systems. As part of the switch, the company recently finished migrating from IBM 370- to 390-class hardware and is moving from MVS/XA to MVS/ESA to improve networking capabilities.

Michael Abramson

General Electric's Jet Engine *manufacturing center*

⑧

BOISE CASCADE CORP.

James E. Harder, *director, information technology*
Twenty years ago, lumber products giant Boise Cascade pioneered one of the first integrated personnel systems, which handled everything from health insurance to retirement planning to payroll. Since then evolutionary change has continued. At present, a DB2 front end from IBM is being grafted onto the original IMS DL/1 database. The goal is to provide more flexible, decentralized reporting capabilities.

Corporate decentralization has come as the $4.2 billion firm in Boise, Idaho, gradually refocused on its core wood products businesses during the 1980s. As part of the change, Elwood explains, IS operations were slowly transformed from utility to business functions. "As a company that takes 25 years to grow its products," he says, "we are more apt to go to gradual change."

⑨

POLAROID CORP.

A. L. Hyland, *director, worldwide systems*
The firm that invented instant photography is using anything but instant solutions for its IS problems. A recent Arthur D. Little, Inc. study of the $2 billion, Cambridge, Mass.-based firm concluded that such quick fixes as outsourcing wouldn't be cost-effective for the instant film pioneer. Instead, Polaroid is gradually standardizing its central and regional computing capabilities.

Last July, for instance, it finished recentralizing corporate computing applications onto its IBM mainframe in Waltham, Mass. That facility will in turn extend high-speed links to DEC VAX-equipped national marketing and distribution centers throughout Western Europe. The key, Hyland says, is staff involvement. "We've used a lot of E-mail to keep people involved with these projects from the start," he says.

Involvement and concern are Polaroid's watchwords in larger circles as well. Long known for spending heavily on R&D (7% of sales), Polaroid last year budgeted 8% of its capital spending for environmental improvement projects.

⑩

INLAND STEEL INDUSTRIES, INC.

William Howard, *vice president, information technology*
Inland's goal is simple, Howard says: Get "more information out of the masses of data" the $3.8 billion company now processes. The Chicago-based company, which ranks fourth in sales among U.S. steel producers, is working to lay common data dictionaries, data architectures and user interfaces over its patchwork of new and existing applications, such as order processing and distribution. These efforts are under way in spite of a slightly reduced IS budget.

To get the biggest bang for its buck, the IS organization is being realigned to get closer to user groups, explains Howard, whose position was created last fall. As Inland pursues its joint ventures in cold rolling and coating processes and increases its custom steel work, IS is going the other way. To cut costs, Howard's IS staff is moving to off-the-shelf applications rather than custom or homegrown ones.

BRIEFS COMPILED AND WRITTEN BY
TONY BAER

Amoco Strikes Pay Dirt With Hybrid IS

Centralizing and decentralizing cuts IS costs 25%

BY MARK FRITZ

Instead of tangling its feet by moving in two directions at once, Chicago-based Amoco Corp. has taken two giant leaps ahead.

During the past few years, Amoco's information systems department has been centralizing and decentralizing at the same time. Although that sounds contradictory, John R. Reid, Amoco's vice president of information services, says the hybrid approach has paid off doubly.

Overall IS savings could reach 25% this year, according to Reid. And that doesn't include the "soft," or less tangible benefits, such as improved staff enthusiasm and increased pride of ownership, he adds.

With 1990 revenue of $32 billion, Amoco is the second-largest natural gas producer in the country. The company currently employs 49,000 workers, operates 60 chemical plants, two research centers and eight refineries and has business offices located in 40 countries.

Shortly after celebrating the company's 100th birthday in 1989, Amoco executives engaged in much "internal reflection" about the firm's future direction. This introspection came at a time when management was eager to "flush redundancies out of our [technology] system," Reid recalls.

Advances in networking, telecommunications and data storage and management made widespread consolidation feasible, Reid says. "We asked ourselves, 'Could we push the technology a little harder and realize some economy-of-scale savings?' "

Thus was born a massive, two-year data center project. When it began, Amoco had data centers in New Orleans, Denver, Houston, Chicago and Tulsa, Okla. First, the New Orleans center was absorbed into the Houston center. Next to be absorbed was Denver.

The crowning moment occurred over Memorial Day weekend in 1990 when the entire Chicago data center was packed into tractor trailer trucks and hauled to Texas. "We shut down on Friday the 25th," Reid says, "and when the other [Chicago] office people came back to work on Tuesday, it was gone."

The move involved tons of equipment and "hundreds of thousands of tapes," Reid says, not to mention two years of planning. It was also a "very risky venture" from a business standpoint, since the move involved much crucial transaction-processing information, including credit-card and ordering information.

David Joel

Amoco's Reid *asked: 'Could we . . . realize some economy of scale savings?'*

After the dust cleared just three days later, Amoco was a two-data center company, with one in Tulsa and one in Houston. Amoco chose not to consolidate into just one center for security reasons.

Centralizing makes a lot of sense for several reasons, according to Reid. Fewer data centers means less hardware and fewer leases, as well as centralized technical expertise and cost control.

Just as the IS department was beginning to catch its breath, decentralizing began. The philosophy, Reid explains, was simple: "Everything directly related to business units should be directly controlled by them."

Decentralization, he adds, was tied closely to Amoco's overriding belief that responsibility and accountability must migrate down the management hierarchy, allowing people at lower levels to better respond to market changes.

On Dec. 7, 1990, Amoco announced it was reassigning 500 of the company's 2,000 IS employees at corporate headquarters to end-user divisions. The changeover was completed by March and involved mostly "movement on the organizational chart," Reid says.

Workers who formerly reported to Reid's corporate IS unit now answer directly to the vice president of planning and administration at one of the three Amoco operating companies. All reassigned personnel were applications designers, developers and analysts. Other corporate IS employees, including those in facilities, operations and technology management, were unaffected and remained centralized.

Under the new setup, the central, corporate IS group headed by Reid still sets IS policy for corporatewide architecture, hardware and staffing. All IS recruitment is still done in Chicago.

The headquarters group controls an estimated 760 million instructions per second (MIPS) of computing power, while various business groups control another 500 or so MIPS.

Reid says it is too soon to get hard data attesting to the success of the decentralization drive. But he says members feel good about the move. "I think they have a better sense of belonging to an operating company," he says. "There's a better partnership now."

The moves seem to be paying off. Last month, Amoco and Burger King opened the nation's first fast-food restaurant/gas station in Westchester, Ill.

②

UNOCAL CORP.

Paul R. Jones III, *director, corporate information services*

Unocal, the world's largest geothermal energy producer, is no stranger to tapping internal resources. The Los Angeles-based company, known on the West Coast as "an earth resources company," committed almost 3% of its $140 million IS budget in 1991 to retraining its 375-member IS staff. Jones' crew is currently merging its scientific and commercial computer centers into one cohesive group.

③

DOW CHEMICAL CO.

Donald S. Pirkle, *vice president, information services*

Global communications is good chemistry at Midland, Mich.-based Dow Chemical. The U.S.' second-largest chemical company (after Du Pont Co.), Dow conducts more than half of its business overseas. That helps explain an $85 million telecommunications budget for 1991.

Dow is often cited as one of the world's best managed companies, so the high level of communication with its IS department should be no surprise. It's not uncommon, for instance, for an operations representative and an IS manager to be pulled from a foreign facility back to the home office for briefings. The two would typically be informed about how a project under development at one site might be adapted for overseas use.

This technique is used in implementing Dow's ambitious 20-year-old proprietary customer satisfaction systems, which include order chain, inventory availability, materials management and accounting. The company pulled in a $1.3 billion profit for 1990.

④

PHILLIPS PETROLEUM CO.

P. J. Gottardi, *manager, information services*

When you are the largest U.S. producer of natural gas liquids, you need to think production. But when you put more emphasis on chemicals and plastics, you're talking research. This combination of businesses makes Phillips' IS department a staff with a mission: learn and learn some more. For this reason, Gottardi's 1,411 staff members spend a lot of time teaching themselves. One percent of the New York-based company's IS budget and a good chunk of its outsourcing goes to staff training. The IS department's next research project will be to research his department, since IS is expected to grow by 30% as a result of a corporate redefining of data processing.

⑤

FREEPORT-MCMORAN, INC.

Ron P. Landry, *director, information services*

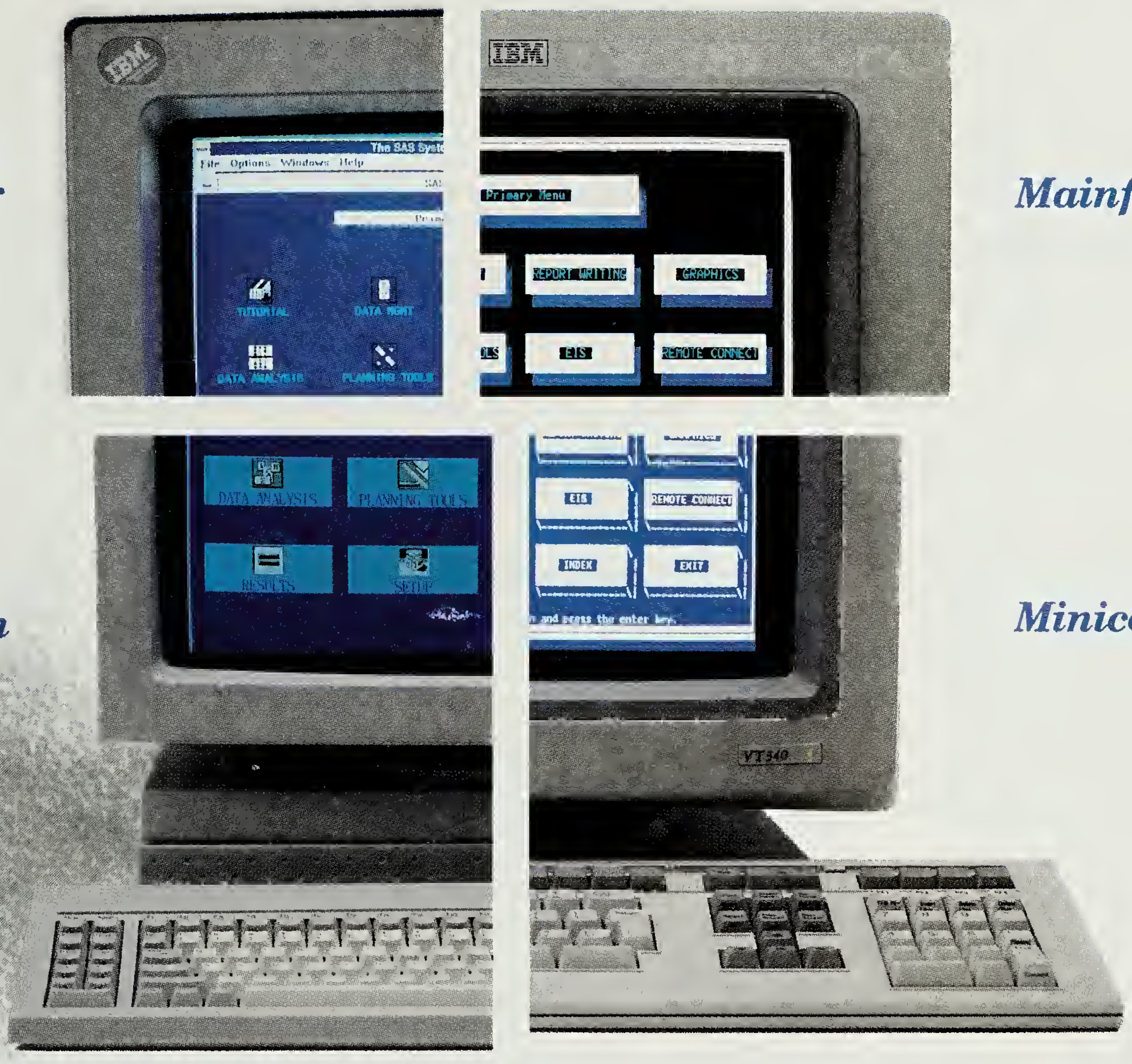
A $1.5 billion mining company, Freeport-McMoRan might be smaller than its industry peers. But its IS department is growing in stature in the eyes of the New Orleans-based company's brass. In fact, Landry says his 78-member staff now gets as much representation in corporate decisions as the financial department does. In the midst of a

Continued on page 56

Ian Murphy/Tony Stone Worldwide

Data center consolidation *remains popular at petroleum and chemical companies*

No Matter How You Slice It



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major corporate restructuring and overseas expansion, that means a lot of responsibility.

The negative side is that as Freeport-McMoRan downsizes, the IS department has to learn to do more with a smaller, $15 million budget — down almost $2 million from 1990. Landry's crew is now tackling an expansion of computing support to copper and mining operations while adding a private international data network.

⑥

AIR PRODUCTS & CHEMICALS, INC.

Peter W. C. Mather, *vice president, information services*

Agreeing with the old saw that tough economic periods are a good time to go back to school, the Allentown, Pa., industrial gas and chemical supplier invested heavily in its 388-member staff as the recession took hold. Training funds were hiked from 1% of IS spending to 4% of the $50.5 million total IS budget for 1991. In addition, almost 500 more of its 10,120 employees were added to the company's user ranks in the last year.

Two recent developments illustrate the growing stature of IS at Air Products. Mather was recently appointed to the corporate management committee, and all company operating groups are now required to integrate an information technology strategy with their long-range business plans.

⑦

CHEVRON CORP.

William Bartz, *manager, computer operations*

You don't have to tell $39.2 billion, San Francisco-based Chevron Corp. that growing up isn't always easy. During 1991, the largest U.S. producer of natural gas might have been able to focus on completing its 1984 merger with Gulf and Western Corp., or its acquisition of Tenneco, Inc.'s $2.5 billion worth of Gulf of Mexico wells. Instead, during the Persian Gulf war, the company's IS chief spent nights reviewing international operations through Pentagon briefings.

However, even a few Scud missiles couldn't stop Chevron's IS department from its forward charge of integrating Gulf's operations into a seamless unit. Chevron recently hit a key computing milestone when it integrated a user interface that allows business analysts to access data across the corporation. Prior to this, accessing mainframe-based data was too forbidding to most nontechnical users.

PEER RATINGS

Top five companies according to *Premier 100* peer rating

Company	**Points**
• Amoco Corp.	8,805
• Air Products & Chemicals, Inc.	8,760
• Chevron Corp.	8,745
• Dow Chemical Co.	8,715
• Phillips Petroleum Co.	8,685

To ensure that its growing pains remain a figurative discomfort, Chevron is also spending $1,000 per user on a new ergonomics program.

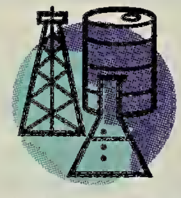
⑧

B. F. GOODRICH CO.

Matthew J. Battista, *vice president, administration and information services*

There's a depth of IS tread at B. F. Goodrich these days. The Akron, Ohio, firm is highly divisionalized to handle its production of specialty chemicals, not to mention its aerospace and specialty products.

The largest of Goodrich's divisions, Geon, is also the principal IS vehicle at the firm. The Geon Vinyl Division is streamlining its entire range of processes — from plant operations and functions all the way to product scheduling and process control. IS efforts at Goodrich are sustained by a budget of approximately $25 million.



PETROLEUM/CHEMICALS

Response base for all charts:
10 *Premier 100* companies from industry group

SUCCESS FACTORS

1. Teamwork and management support
2. More user control and involvement
3. Understanding business systems and architectures

BIGGEST CHALLENGES

1. Coping with changing economics
2. Increasing IS productivity and efficiency
3. Meeting the demand for high-quality customer service

CRITICAL TECHNOLOGIES

1. Local-area networks
2. Imaging systems
3. Expert systems

⑨

USX CORP.

Richard Robinson, *manager, operations and data services*

It's well-known that oil and water don't mix, but the verdict is still out on whether oil and steel will blend at $19.5 billion USX (formerly U.S. Steel). A 1982 merger with Marathon Oil, a $3 billion purchase in Texas Oil & Gas and a 1990 proxy fight with investor Carl Icahn have put the company into a transition-and-integration mode at a pace that would make even founder J. P. Morgan proud. Based in Pittsburgh, USX operates as one business unit but is now represented on Wall Street by two separate offerings. Its IS department, far from immune from USX's corporate retooling, is in the midst of a makeover in its corporate and operational functions.

⑩

ATLANTIC RICHFIELD CO.

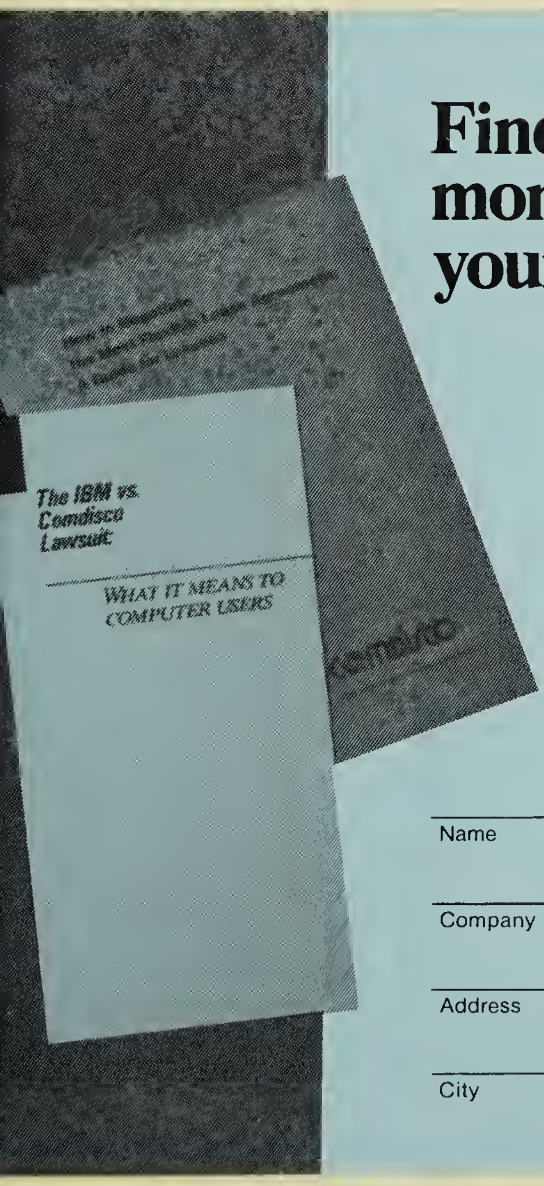
John Coman, *manager, networks and information services*

Los Angeles-based Atlantic Richfield Co. (Arco) prides itself in being different. And as anyone with four wheels in California can tell you, the West Coast's newest petroleum purveyor is fueling its way to becoming the leading gasoline company by using leading-edge information technology. From debit cards at its AM/PM Arco stations to image processing in-house, Arco is getting the most out of its technology.

The technology push is already showing up in profits: The $20 billion company pulled in a cool $2 billion in profits in 1990.

Further returns are promised by a current IS budget of $235 million. Besides $25 million earmarked for in-house-developed telecommunications, 20% of IS spending is devoted to outsourcing projects, which include more telecommunications support, voice networking and scientific processing.

BRIEFS COMPILED AND WRITTEN BY
WILLIAM BRANDEL



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Five terms and conditions that could save you millions on your next lease

Recent events in the leasing industry have shown that companies can no longer select a lessor based solely on lease rate. The terms and conditions of your agreement are now key considerations in determining your true long-term costs and hardware flexibility.

Without flexible terms and conditions, your computer hardware options can be severely restricted when it comes time to upgrade or replace your equipment during the lease term. The question is: What can you do to protect yourself?

First, look closely at the leasing company you choose. Second, look even closer at your lease terms and conditions. And third, know your rights.

Following are some of the suggested rights you should consider when negotiating your next lease agreement.

1 The right to add new, used, or third-party upgrades with or without financing from the original lessor.

If your lease makes it difficult to seek competitive upgrades, your only alternative may be to upgrade through the original lessor — at prices they dictate.

But if your lease gives you the flexibility to install new, used, or third-party upgrades from the vendor of your choice, you can decide which equipment to acquire, from whom — and at a price that's right for your budget.

2 The right to reconfigure subleased equipment.

Most leasing companies say they will allow you to sublease. But, with a little digging, you may discover they will only allow you to sublease if the system isn't reconfigured. This is an inconvenient, impractical, and unnecessary request, especially if you're only seeking a memory upgrade.

The right to reconfigure subleased equipment is not only reasonable, but necessary if subleasing is to be a practical, economical alternative for you.

> *The fact is that upgrade expenses, not the rate of your lease, are likely to have the biggest impact on your overall costs. And if your lease has restrictive upgrade terms and conditions, it could end up costing you far more than any initial lease-rate savings. In some cases, millions of dollars more.*

3 The right to sublease to other leasing companies.

Your lease agreement may state that your lessor will not "unreasonably withhold" its consent to allow you to sublease. But some lessors consider it reasonable to restrict your subleasing rights to end users only. They don't want independent leasing companies handling their equipment because, ultimately, convenient subleasing helps keep prices down.

Unless you have the time, resources, and skills required to remarket your equipment directly to end users, you should negotiate the right to sublease to other leasing companies.

4 The right to return systems with like parts at the end of the lease.

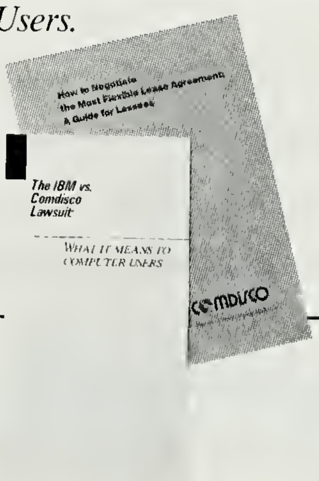
The leasing industry has long recognized that parts are *fungible* — interchangeable — with other parts from the same manufacturer bearing the same part number.

You are the direct beneficiary of parts fungibility: leasing companies discount their upgrades because of the remarketing revenues they receive from parts removed during reconfiguration.

Without this right in your lease agreement, you may be forced to return your system at lease-end with the *exact* serial-numbered parts with which it was originally configured. Your upgrade costs could be much greater.

5 The right to call Comdisco for our free lease-negotiation guide and white paper.

For a comprehensive discussion of these issues, Comdisco has two free guides to help you: *How to Negotiate the Most Flexible Lease Agreement: A Guide for Lessees* and *The IBM vs. Comdisco Law suit: What it Means to Computer Users.*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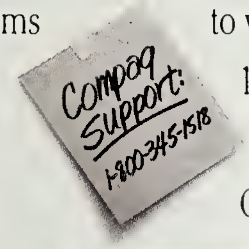

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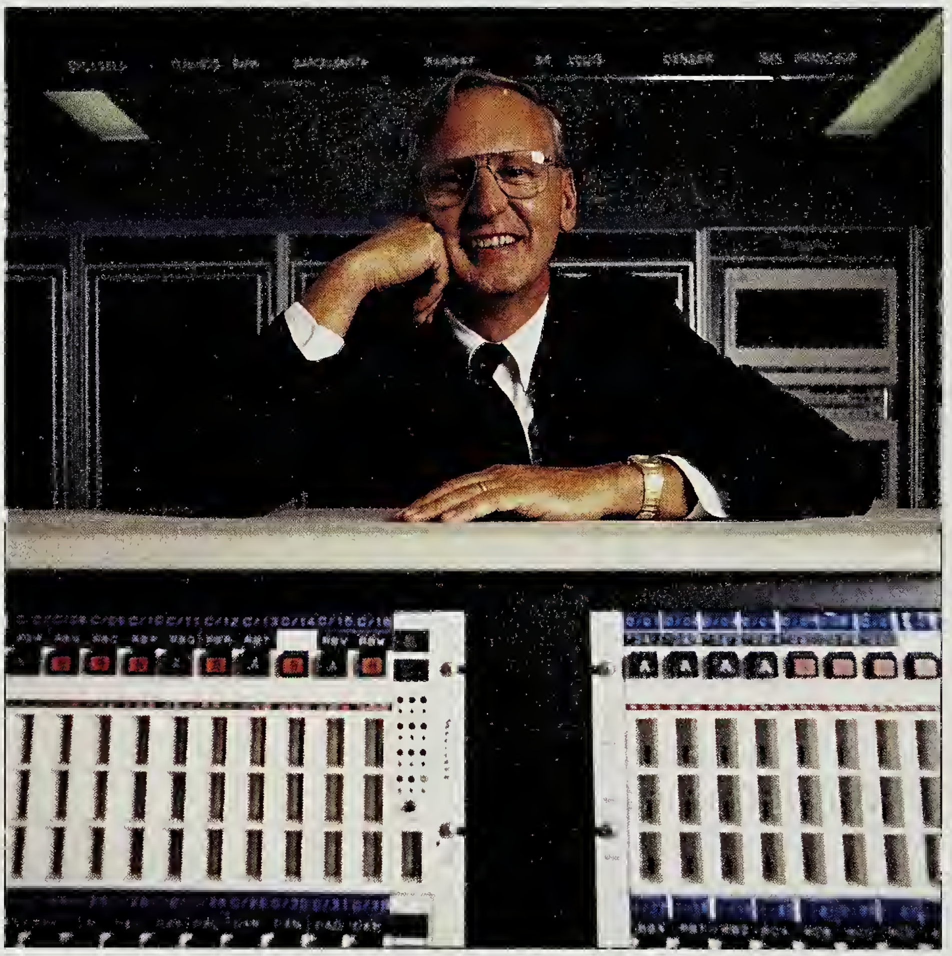
There's A Little Technology In Every Merck Drug

IS proves to be the elixir of innovation

BY KIM S. NASH



Joyce Ravid

Merck's Pater *says the company's motto for information technology is 'Do it first and do it best'*

Attention middle-aged men: You and your prostate gland can thank Merck & Co. for using computers so well.

In April, the $7.7 billion pharmaceutical giant broke industry records by submitting for Food and Drug Administration (FDA) approval a new prostate treatment, called Proscar, less than nine months after ending clinical tests. (The industry average is 18 months to two years, a Merck spokeswoman said.)

Such time-shaving was possible because Merck wrings every last drop from its $210 million information systems budget, says Bill Pater, executive director of IS management at the Rahway, N.J.-based company.

That's no idle boast. Merck is known in the business for getting more medicines to market faster than any other company. In the 1980s, it invented and marketed no fewer than 19 major drugs. Small wonder that Merck has been named "America's Most Admired Company" by *Fortune* magazine readers for the past five years.

Merck operates a worldwide network of 100 IBM Application System/400s, linked via IBM's Systems Network Architecture, and 100 Digital Equipment Corp. VAXs connected by Decnet. Scientists who wrote the Proscar application, for example, used this network to pull data from several of Merck's 17 research facilities worldwide. Information was then compiled on a single Intel Corp. I486-based personal computer from AST Research, Inc. and sent to the FDA.

"If we get Proscar to market faster, that's good for a lot of people," Pater says. According to the American Cancer Society, half of all men over the age of 45 suffer from benign swelling of the prostate, a chestnut-size gland next to the bladder that helps propel seminal fluid.

Pater, a 25-year company veteran, is temporarily filling the post vacated by Albert Cinorre, Merck's vice president of computer resources, who retired in January. Pater credits Merck's "Do it first and do it best" attitude toward information technology with driving the 100-year-old company to No. 1 market share positions in the U.S. and worldwide. Merck was among the first pharmaceutical companies in 1987 to electronically submit a new drug application to the FDA, for instance.

Merck isn't resting on its laurels, though. It wants to cut *all* paper from certain sites, such as its vaccine manufacturing plant, where paper dust can spoil sterile conditions. Work has begun on an imaging pilot using Process Operations Manufacturing System (POMS), a package from IBM and partner Incode Corp., to collect production cycle data and integrate it with Merck's imaging system. POMS and IBM's Fix/Dmacs, another process control system, have helped eliminate "practically all" of the paper in administrative and process control tasks at the plant, Pater says.

"People now transfer forms and batch sheets on-line," explains Pater, who is designing similar imaging setups for three other U.S. locations.

The company is also racing ahead with three-dimensional modeling to speed other research activities. Scientists concoct potential uses for new compounds on workstations from Silicon Graphics, Inc. and Sun Microsystems, Inc. that are connected to an IBM 3090 mainframe with vector-processing capabilities. The effects of Proscar in a dog, for example, were tested using this kind of noninvasive modeling.

Moreover, Merck has cut travel costs and time and has improved data sharing by connecting U.S. sites with Rembrandt and Rembrandt II, videoconferencing gear from Compression Labs, Inc. in San Jose, Calif. Plans are afoot to extend video systems worldwide.

Laptop advantage

To keep profits flowing, Merck has built a huge laptop-toting sales force. Nearly 3,000 U.S. salespeople in the company's major divisions started peddling their wares via Compaq Computer Corp.'s LTE/286 laptops two years ago. Pater says Merck may soon roll out a similar plan in Europe.

Because sales-force effectiveness is so important in the high-stakes pharmaceutical industry, Merck's IS department is "tightly woven" with its sales and marketing staffs, Pater says. The IS staff trained the sales force to use laptops and regularly stages worldwide videoconferences that provide marketing guidance and competitive information.

To keep technology humming, Merck employs 1,100 IS people in a centralized department. User groups in each business division pitch technology projects to corporate IS, which then makes recommendations to a group of top business executives. Top executives prioritize and sign off on IS projects.

"The centralized way we operate gives us the best balance of business knowledge in the user divisions and technology skills of corporate IS," Pater explains.

There's no sign of things slowing down. Merck plans to spend $1 billion on research and development this year, and Pater says management is eager to support further flexing of technology muscles. "There's a spirit of inquiry and a willingness to try something new all the time."

2

BRISTOL-MYERS SQUIBB CO.

Alex J. Gibbons, *corporate director, information services*

Bristol-Myers Squibb went from a *Computerworld Premier 100* no-show last year to No. 2, partially on the strength of a newly pumped up commitment to technology. IS spending shot up 75% this year, to $195 million — evidence of the industry's do-or-die IS buildup. A $12.7 billion buyout of Squibb in 1989 deepened the company's pockets and helped make the New York-based firm the second largest seller of prescription drugs, behind Merck.

PHARMACEUTICALS AND FOOD

Response base for all charts:
10 *Premier 100* companies from industry group

SUCCESS FACTORS

1. Accessibility of information and networks
2. Teamwork and management support
3. Improved customer service

BIGGEST CHALLENGES

1. Government regulations
2. Adapting employees to changing trends
3. Price control

CRITICAL TECHNOLOGIES

1. Local-area networks
2. Imaging systems
3. ISDN

Installed processors are valued at $75 million and PCs and terminals number 23,500. Some 48% of the firm's IS spending goes to 1,547 staff members — an average exceeding $50,000 in equipment and support.

3

PFIZER, INC.

William Mullin, *vice president, corporate information services*

Pfizer has spent $3 billion on health-care R&D since 1981, developing new antidepressants, antifungals and arthritis treatments, among others. The company had a 2-for-1 stock split early this year, capping $6.6 billion in 1990 sales. Pfizer spends an estimated $20 million on IS, including 54% for IS personnel. One quarter of the company's 42,000 end users can choose either PCs or terminals for daily work.

4

ELI LILLY AND CO.

Lee Gery, *director, information services*

Sky-high sales of the Prozac antidepressant have kept Eli Lilly feeling good. Strong financial performance lets the company infuse IS with an estimated $42 million of its $5.2 billion in sales. R&D is also strong; Lilly reinvests 14.5% of its revenue in developing new products.

Lilly's recent courtroom battles also appear to be over, which means the Indianapolis company can concentrate on booming business such as biotechnology.

5

BECTON, DICKINSON & CO.

Roland Cyr, *vice president, information technology*

Becton, Dickinson, the hypodermic-needle kingpin, got a shot in the arm in 1990 with $2 billion in sales. Continued diversification helped the medical and diagnostic product manufacturer fend off competitive threats from Japan and attempted stock takeovers. The firm's 448-member IS staff gets approximately 46% of a $50 million IS budget. And with $25 million worth of major processors and 8,000-plus PCs and terminals to support, IS staff members have their hands full. A worldwide systems and communications network, plus new electronic data interchange and human resources projects, ensure continued technological leadership at Becton, Dickinson.

6

UPJOHN CO.

Susan Barber, *director, information resource management*
If IS managers at Upjohn are losing their hair, they can't blame it on budget-related stress. The department received an estimated $53 million in 1991.

Sales of baldness treatment drug Rogaine and pain reliever Motrin helped the 20,000-employee firm make a splashy debut in this year's *Premier 100* rankings. Recovering from a drop in net income, Upjohn started a rare consumer-oriented ad campaign for prescription-only Rogaine and managed to grow its year-end stock price by nearly 10 points over 1989.

7

JOHNSON & JOHNSON

Paul DeMarco, *supervisor of computer operations*
With an estimated $215 million dose of the New Brunswick, N.J., company's $11 billion revenue this year, it's safe to say that Johnson & Johnson's IS operation doesn't need any Band-Aids.

The world pharmaceuticals sales leader isn't letting a legal tussle with 3M Co. over ownership of a fiberglass tape patent break its stride.

PEER RATINGS

Top five companies according
to *Premier 100* peer rating

Company	Points
• Eli Lilly and Co.	8,670
• Johnson & Johnson	8,640
• Merck & Co.	8,640
• Abbott Laboratories	8,625
• Upjohn Co.	8,595

An extensive, worldwide distribution network and just-in-time distribution systems keep Johnson & Johnson's IS staff members busy. An innovative technology training program plus high-profile community and environmental policies keep Wall Street respect high.

8

SCHERING-PLOUGH CORP.

Don Langston, *director, computer center*
Brisk sales of popular over-the-counter drugs such as Chlor-Trimeton helped propel Schering-Plough to a strong financial showing in 1990. The Madison, N.J.-based company reported revenue of $3.3 billion, keeping its stock soaring.

Schering-Plough, the eighth-ranked U.S. pharmaceuticals company, has an estimated $40 million IS budget. The firm puts about 10% of its revenue toward R&D. A new research facility scheduled to go on-line next year should help the company expand its drug stockpile. Among the new projects are medicines that act on the immune system.

Acquisitions have also played a role in the company's success. Schering-Plough's subsidiaries include the following: Scholl, Inc., which was acquired in 1979, Key Pharmaceuticals in 1986 and The Cooper Companies in 1988. Maybelline Cosmetics was sold to Playtex Holdings, Inc. for $300 million in 1990.

⑨

ABBOTT LABORATORIES

Kenneth Farmer, *vice president, information services and administration*

An estimated $150 million IS budget financed a variety of projects at Abbott Labs, a supplier of hospital and consumer products, including continued work on a 4-year-old automated purchasing network established with 3M Co.

The $6.2 billion company is also getting into the business of selling software: A deal signed earlier this year lets Abbott sell health-care planning and marketing software. With numerous new drugs pending approval, including acquired immune deficiency syndrome inhibitors, new sleeping-disorder drugs soon to hit the market and a steady increase in R&D spending, Abbott seems sure to keep reaping big profits — good news for IS.

Abbott Labs in Abbot Park, Ill., is also the major shareholder in Amgen, a large biotechnology company, and owns half of Takeda-Abbott Pharmaceuticals, a joint venture with a Japanese drug company.

Roger Tully/Tony Stone Worldwide

Pharmaceuticals firms *continue to invest heavily in IS for R&D*

The 1991 ranking marks Abbott's fourth appearance in the pharmaceutical industry's Top 10. It ranked first in 1988 and 1989 and second in 1990.

⑩

PEPSICO, INC.

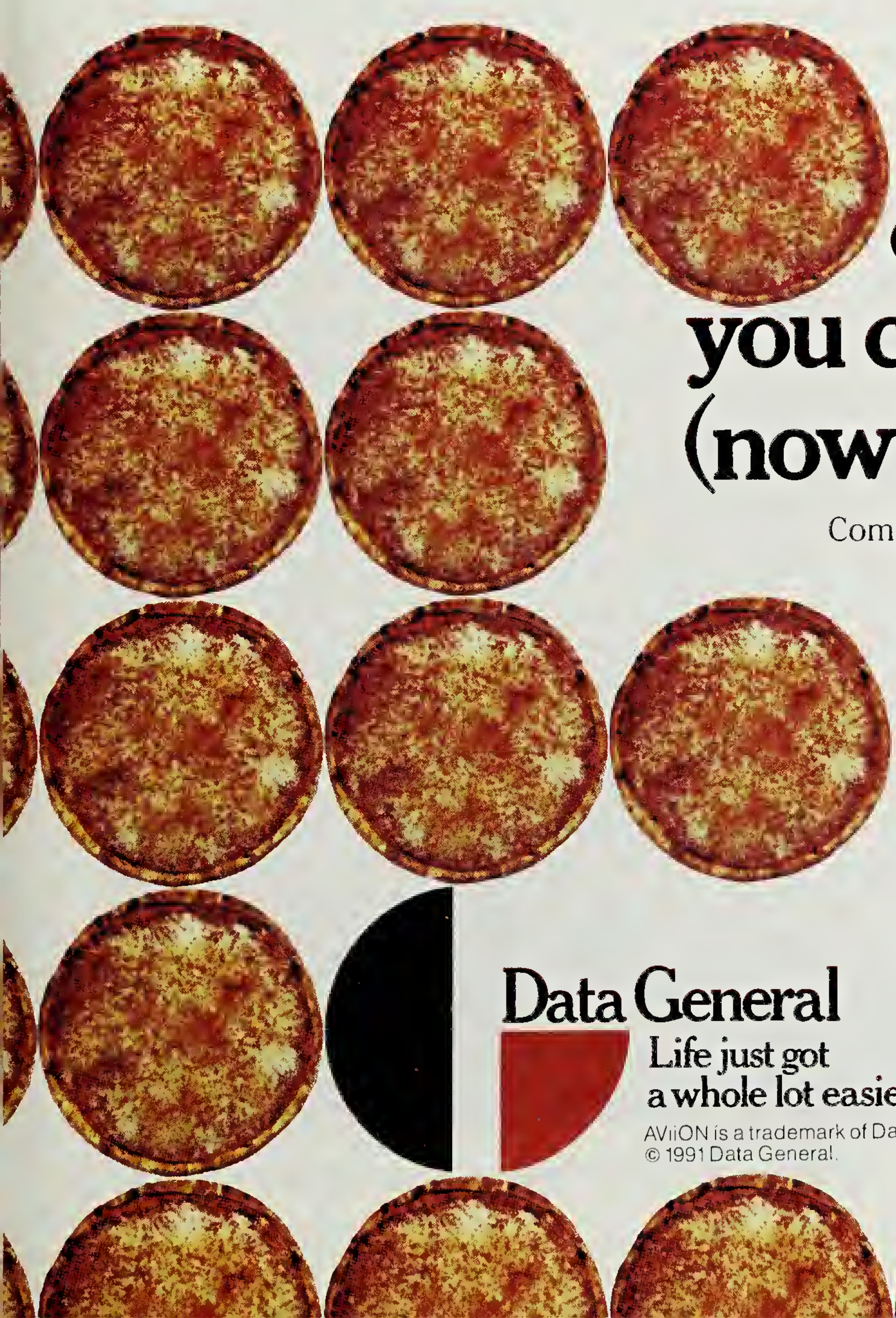
Allan B. Deering, *vice president, information services*

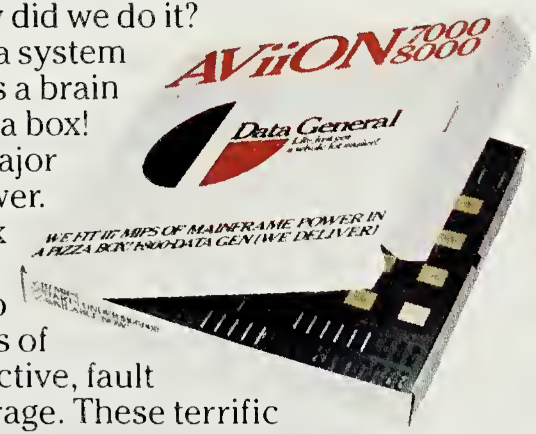
For Pepsico, it's lonely at the top: It is the only food and beverage company to make the *Premier 100* list this year.

It was a busy computing and business year for the Purchase, N.Y.-based company: PC-based point-of-sale systems and streamlined management were put into place at the company's Pizza Hut, Inc., Taco Bell and Kentucky Fried Chicken Corp. units. Pepsico also made a big push into European markets, boosting overseas sales by 34%.

Pepsico spent $265 million of its $17.8 million worldwide revenue on its 1,000-member IS work force. Continued work on a global food supply network and the introduction of handheld computers to track sales at distribution points were among notable IS projects.

BRIEFS COMPILED AND WRITTEN BY
JOHN WEBSTER

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High-Tech Buildup Arms Sears For War

BY CHARLES BURTON

Sears, Roebuck and Co. is at war. The enemy is expenses; the big weapon is information technology. Battling to gain momentum, the $56 billion merchandising and financial services giant is spending $1.17 billion this year on information technology. Charles A. Carlson, president of Sears Technology Services, Inc. (STS), says the hefty budget shows the firm's view of information systems as a "key factor" in cutting costs and boosting profits.

In fact, Sears spends more on information technology and networking than any other noncomputer firm in the U.S. except The Boeing Co. So even though 1990 profits plunged 40% to $902 million, the Chicago-based company still boosted IS spending by 19%.

The deep technology pockets are needed to wage war across the many fronts of Sears' diversified empire, which include Dean Witter Financial Services, Inc., Coldwell Banker, Discover Credit Corp., Prodigy Services Co. and Allstate Insurance Co.

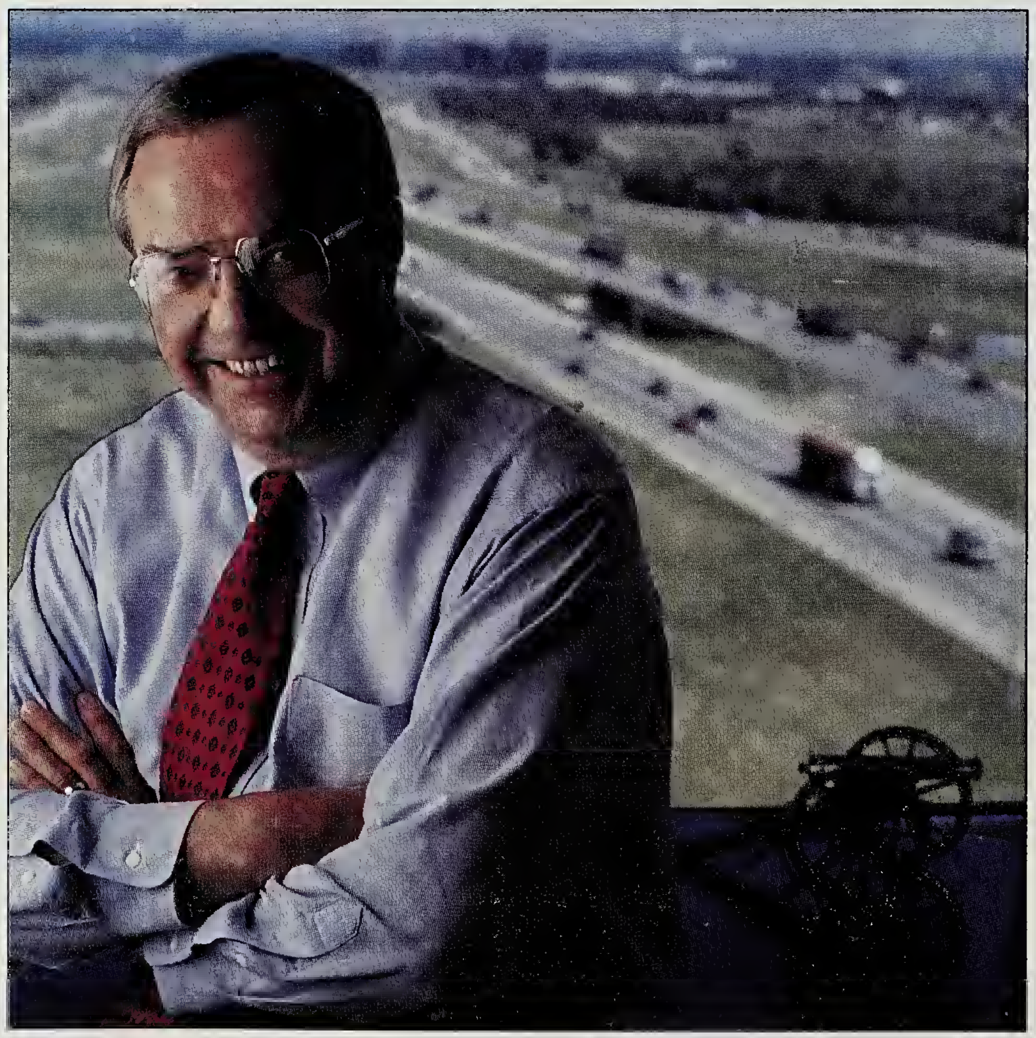
Included in the war chest is a huge capital budget that over the last year financed, among other things, the installation of more than 6,000 IBM Application System/400s for Allstate agents and wide-scale migration from IBM 3090-600Js to IBM Enterprise System/9000s.

The elite guard of Sears' technology efforts is STS, a 1,600-employee subsidiary spun off two years ago. The Chicago-area group played a major role in the "store simplification" program announced by Sears' Merchandise Group in January. The plan centralizes every store's general offices, cashier, customer service and credit function.

Sears is also continuing to centralize IS operations, providing business units with "internal outsourcing" and acting as an IS utility. Three data centers now do the work of 10 centers.

One measure of success, Carlson says, will be how much more processing power can be added to the staggering 2,000-plus millions of instructions per second that Sears now has installed. But Carlson says the final test will be driving down costs while increasing service levels across Sears.

Another key goal is continuing to build partnerships with business units. "Where we don't have those partnerships, it's a full court press to get them in place," Carlson says. Such arrangements, he adds, will ultimately benefit both STS and purchasing at



Kevin Horan

Sears' Carlson: *Nonmilitant style helps build end-user alliances*

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- **23.** Dir./Mgr. Sys. Development, Sys. Architecture
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- **32.** Programmers, Software Developers
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- **13.** Treasurer, Controller, Financial Officer
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individual units by making things "go better, cheaper and faster."

To meet these challenges, the soft-spoken Carlson — who once pursued a career as a professor of English literature — is more likely to use intellectual reasoning than executive fiat. Despite his huge mission and organization, he maintains a "nonmilitant" personal style. He makes it clear that business units, guided by a well-established IS framework, are in command.

For example, in the huge project to computerize Allstate agents' processes, Carlson notes, "we merely developed the networking platform and served only as technical enablers."

It's too early to tell whether Sears' massive technology buildup will launch the 105-year-old retailing giant into profitable new territory. But recent signs are positive: Second-half net income rose 28.4% over the same period last year.

2

WAL-MART STORES, INC.

Robert L. Martin, *senior vice president, information services*

State-of-the-art information systems are well-stocked at the nation's fastest growing retailer.

This year the Bentonville, Ark.-based chain added $20 million worth of NCR Corp. 3445 Unix processors to its information systems arsenal, replacing IBM Series/1 machines in about half its 1,600 stores. IBMs in other stores were replaced by Hewlett-Packard Co. machines last year.

PEER RATINGS

Top five companies according to *Premier 100* peer rating

Company	Points
• Wal-Mart Stores, Inc.	8,910
• Dillard Department Stores, Inc.	8,715
• Kmart Corp.	8,700
• Toys R Us, Inc.	8,685
• Sears, Roebuck and Co.	8,610

Wal-Mart boasts a history of technology innovation. Five years ago, the chain installed a private satellite network, the industry's first. Point-of-sale (POS) and handheld bar-code scanners, automated data centers and electronic data interchange use (EDI) further streamlined operations.

The $33 billion Wal-Mart operates Wal-Mart Discount City, Wal-Mart Super, Sam's Wholesale Club and Hypermart USA. Recently, it expanded with purchases of The Wholesale Club and McLane Co.

3

KMART CORP.

David M. Carlson, *senior vice president, corporate information systems*

Six years ago, you would have been hard-pressed to call Kmart "The Technology Place." But a $1 billion technology infusion and the savvy guidance of Carlson has changed all that for the $32 billion retailer. Among recent projects: a Unix-based, multiuser infrastructure; in-store scanning devices for inventory tracking; a satellite network that links 2,320 stores and permits on-line credit authorizations; and growing use of EDI to improve transactions with suppliers. In August the firm ordered 1,500 Unix minicomputers from Unisys Corp. to complete the Kmart Information Network II.

Besides its Kmart stores, the Troy, Mich.-based firm operates Waldenbooks, Payless drugstores as well as sporting goods, office supply and building supply stores. The parent company's annual IS budget is $216 million. The next challenge for IS is to introduce a quick-response system that lets suppliers customize goods based on POS data.

4

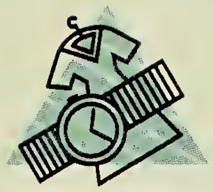
SERVICE MERCHANDISE CO.

Jack Case, *senior vice president, information systems*

Service Merchandise hates waste. To slash utility costs, IS helped develop computerized building management systems in company showrooms. The payoff: a 20% to 25% drop in energy costs.

Nashville-based Service Merchandise has further leveraged this investment with a satellite network connecting its 346 showrooms.

Last year the chain introduced a nationwide computerized gift registry program, which uses the satellite to give customers real-time information. Other initiatives include replacing old Data General Corp. systems with Motorola, Inc. Unix systems to run retail operations and migrating inventory and merchandise replenishment operations from Bull HN Information Systems, Inc. GCOS8 operating systems.



RETAILING

Response base for all charts:
10 *Premier 100* companies from industry group

SUCCESS FACTORS

1. Teamwork and management support
2. Staying close to the business; maintaining an edge
3. Improved customer service

BIGGEST CHALLENGES

1. Competition from other companies
2. Coping with changing economics
3. Meeting the demand for high-quality customer service

CRITICAL TECHNOLOGIES

1. Imaging systems
2. Expert systems
3. ISDN

Founded in 1960, the $3.4 billion retailer runs the largest chain of retail catalog stores in the U.S. and five Service Jewelry stores.

5

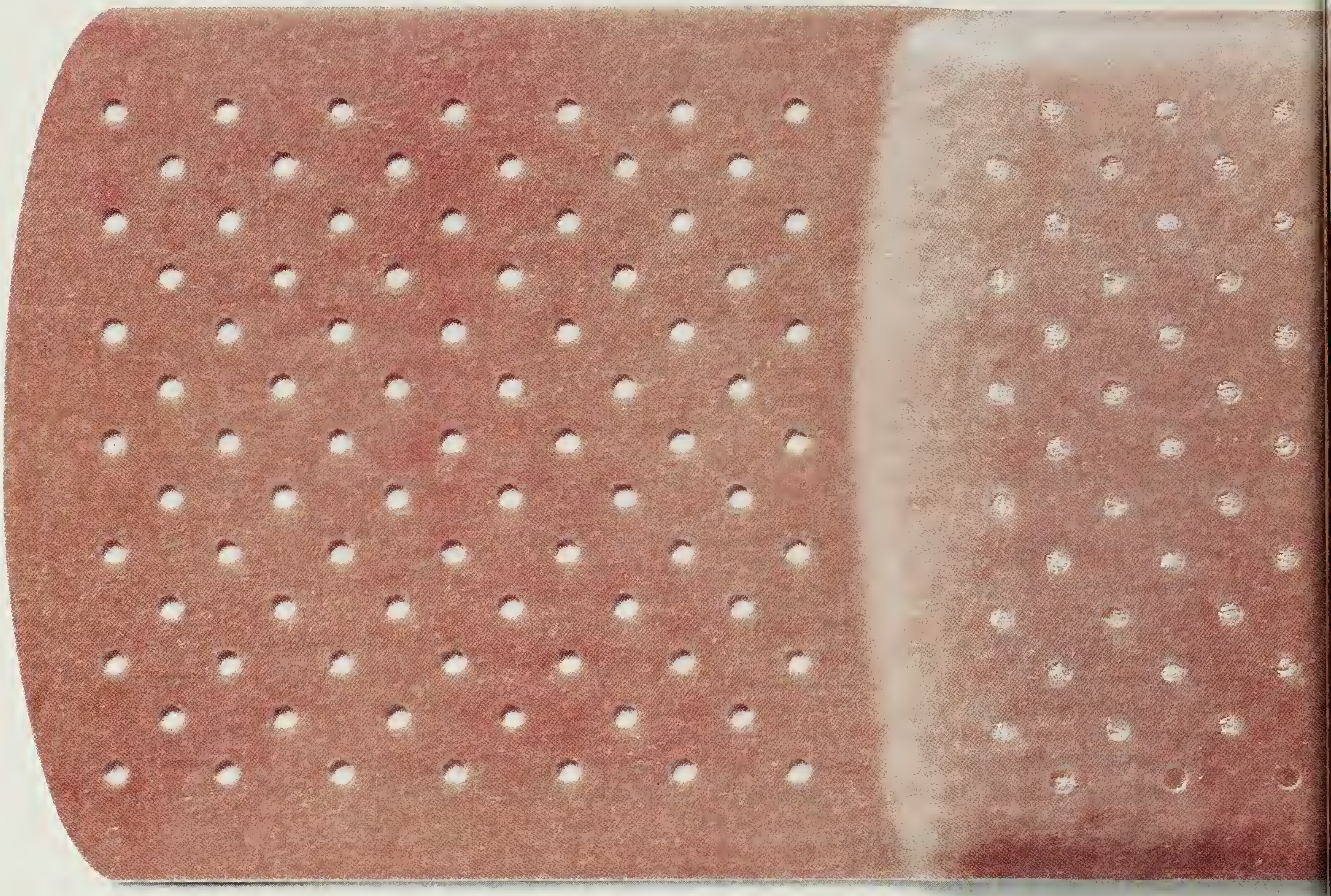
FOOD LION, INC.

A. Edward Benner Jr., *vice president, information services*

Food Lion, arguably the king of discount grocers, is stalking technologies that will cut costs and improve customer service. Recent IS moves include installing in-store Digital Equipment Corp. Microvax systems and IBM personal computers to run store accounting applications. Food Lion has also installed POS scanning devices, has developed an automated warehouse system and is working with vendors to use EDI.

Based in Salisbury, N.C., the $5.5

Continued on page 68



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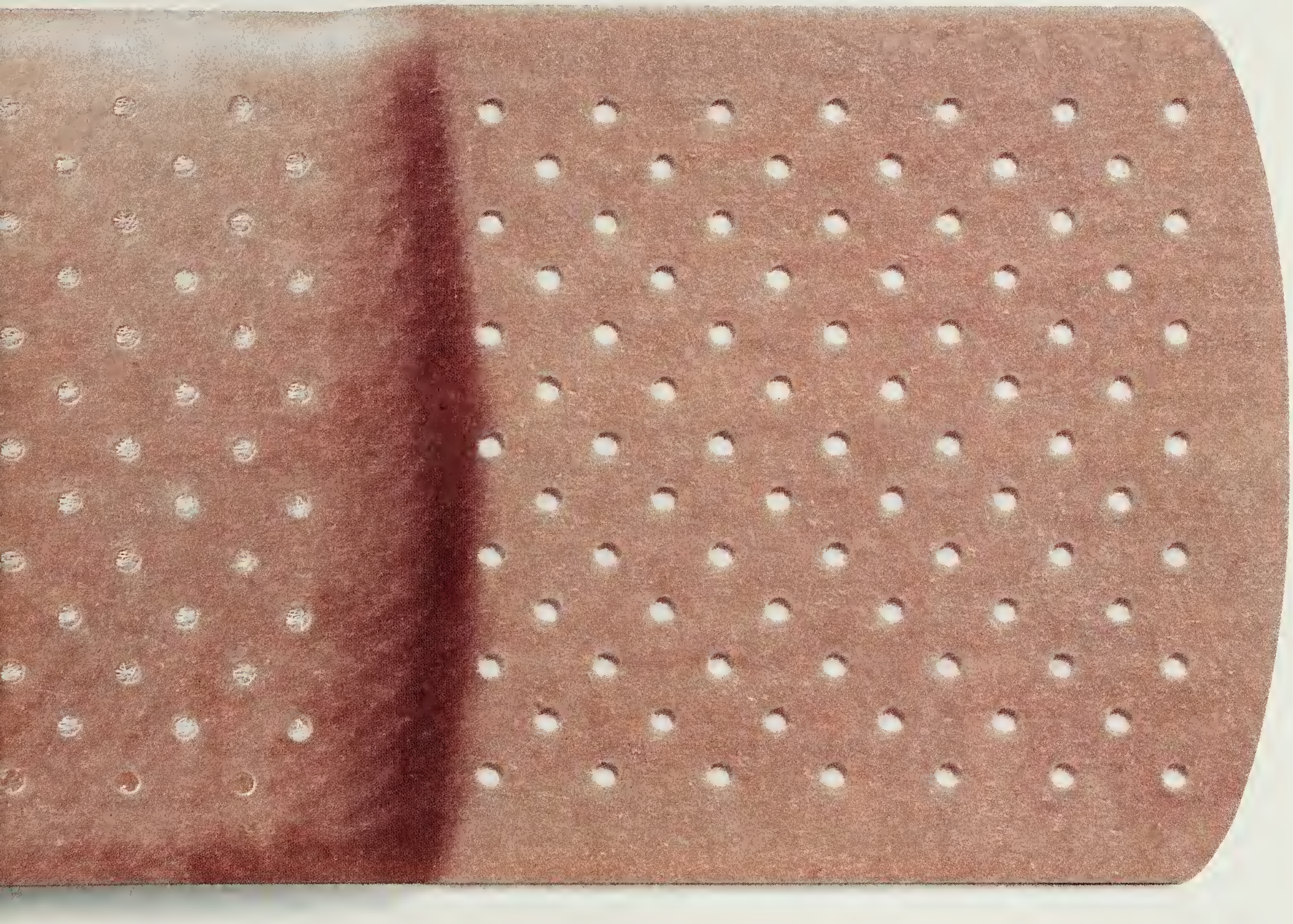

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Continued from page 65

billion Food Lion is among the fastest growing U.S. grocery chains. In the 1980s, the number of Food Lion's stores grew from 106 to 808. Last year, company earnings jumped 26% to $172.6 million. Pretax profit margins are almost double the industry average.

⑥

DILLARD DEPARTMENT STORES, INC.

Malcolm Ritchie, *vice president, data processing*

Dillard prides itself on quickness and keeping one step ahead of competitors. Last year, for example, Dillard acquired J. B. Ivey, a southern retailer, and rapidly assimilated Ivey's 23 stores into its information systems.

Alan Levenson

Retailers *spend less on technology than any other industry*

Founded in 1949, the $3.7 billion retailer operates more than 200 stores throughout the Southern, Midwestern and Southwestern U.S. Profits for 1990 topped $180 million, and revenue jumped 21% from 1989 levels.

To keep the warehouse well-stocked, Dillard uses EDI to speed communications. While other department stores review the previous week's sales, a quick response system at Dillard orders goods to replace the morning's purchases. Currently, the IS operation is testing the use of satellite dishes to transmit data to Dillard stores.

⑦

GIANT FOOD, INC.

Robert Schoening, *senior vice president, data processing*

Giant Food in Landover, Md., has long been one huge step ahead of its competitors in using new technologies. In 1979, Giant became the first food chain to install laser scanners in its stores. Today, state-of-the-art ordering systems and a highly automated warehouse help keep the $3.2 billion company towering over the competition: Giant is No. 1 in the Washington, D.C./Baltimore market, home to most of its 150 stores.

To spread its high-technology faith, Giant awards schools with computers and software in exchange for Giant receipts. In addition, Giant has donated more than 30,000 computers, printers and software items to area schools. Giant's operations include automated teller machines, an import/export business, shopping centers, a trucking brokerage and a wholesale tobacco business.

⑧

PRICE CO.

Marci L. Knight, *vice president, MIS*

When Price opened a cash-and-carry, members-only discount warehouse in San Diego in 1976, it sent a shiver up the spine of more than one competitor.

While other retailers have since copied Price's formula and opened their own clubs, the $5.3 billion Price Club still shines. *Forbes* recently named Price No. 1 in earnings growth among firms in the *Standard and Poor's* 500 stock average for the 1980s.

Besides its clubhouses, Price operates Price Club Industries, which runs photo processing, pharmacy and optical departments at Price Club locations, as well as a meat-packaging plant. The company also owns Price Realty Co. and Price Club Canada, operating eight clubs in Quebec and Ontario.

⑨

TOYS R US, INC.

Dennis Healey, *vice president, information services*

Supporting the information needs of the world's largest and fastest growing children's specialty retail organization is a big job. Fortunately, the IS team at Toys R Us has an estimated budget of $48 million to play with.

This year, Toys R Us ordered more than 1,300 Microvax 3100 systems from DEC for its U.S. stores. Running point-of-sale software to speed credit authorizations, price checks and other store management tasks, the systems are networked to distribution centers and company headquarters in Paramus, N.J.

Founded by Charles Lazarus in 1948, the $5.5 billion company operates about 500 toy stores and 200 Kids R Us clothing stores in the U.S., UK, Hong Kong, Malaysia, Germany, France and Taiwan.

⑩

JC PENNEY CO.

David V. Evans, *vice president, director, information services*

Visions of a fully automated client/server-based retail system called Infostore inspire information systems operations at JC Penney, the $17.4 billion, Dallas-based retailer.

Infostore will not be ready for testing until 1993, but the IS staff at JC Penney plans ahead. JC Penney was among the first U.S. companies to install point-of-sale systems, which now link more than 40,000 JC Penney cash registers.

Today, JC Penney is testing the use of Integrated Services Digital Network to link local-area networks at JC Penney stores. This will enable headquarters to eventually download digitized images of merchandise so that local buyers can view style and color combinations. JC Penney is an electronic data interchange pioneer and is expanding Unix operations toward an open systems environment.

The sixth-largest retailer in the U.S., JC Penney operates more than 1,300 stores. In addition, it has interests in 2,000 Thrift and Treasury drug stores, catalog stores, a telemarketing division, the JC Penney Television Shopping Channel and insurance, banking and real estate operations.

The company spends $171 million on information systems, which is .98% of its revenue.

BRIEFS COMPILED AND WRITTEN
BY LUCIE JUNEAU

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ORACLE	NO
SYBASE	NO

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InterBase	YES
ORACLE	NO
SYBASE	NO

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Handle multi-dimensional data 10 to 40 times faster than traditional row-and-column format. Arrays present the data the way your applications and users need it, for maximum productivity.

InterBase	YES
ORACLE	NO
SYBASE	NO

Blob Filters

An absolute necessity for dealing with multimedia (blob) data in a heterogeneous environment. Store the data once, and let blob filters translate it among platforms and applications.

InterBase	YES
ORACLE	NO
SYBASE	NO

Automatically Activated Two-Phase Commit

Eliminate data loss or duplication in distributed networks. Only an automatic two-phase commit ensures that all remote changes are synchronized, without pages of polling and verification code.

InterBase	YES
ORACLE	NO
SYBASE	NO

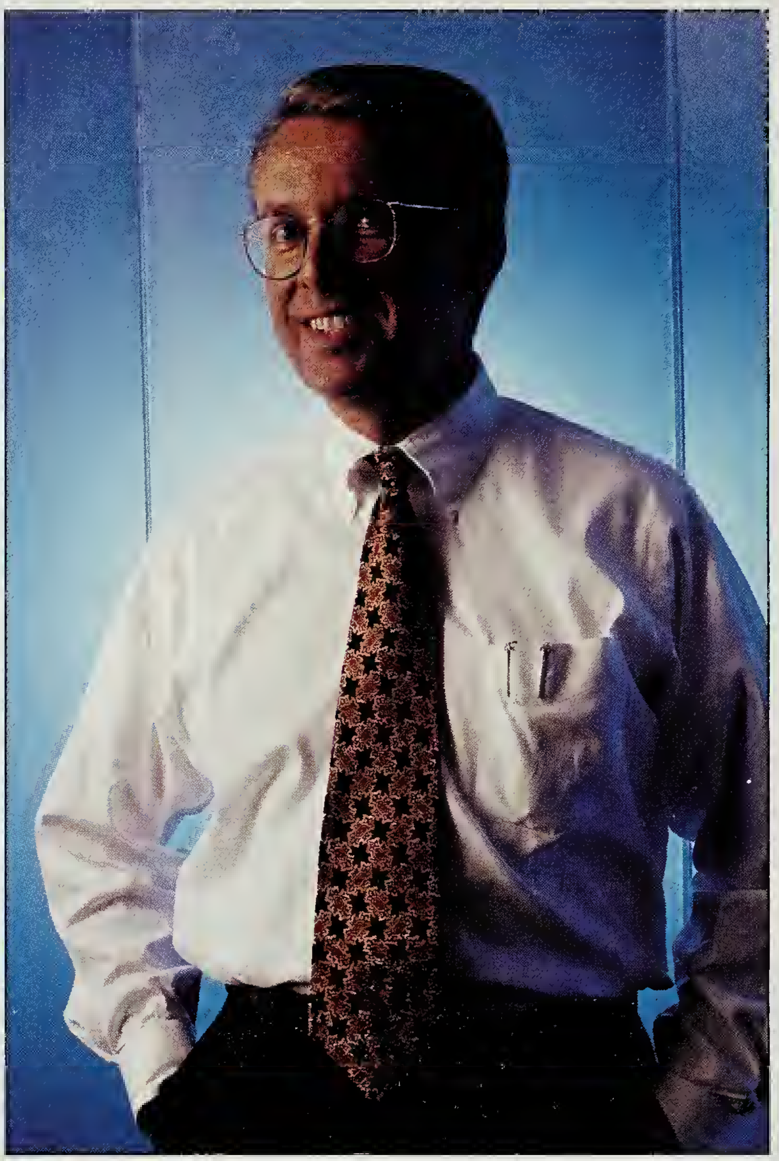
Modular, Sequenceable Triggers

Only triggers in the data dictionary ensure that business rules (integrity) are consistently enforced, regardless of the application. Modular triggers maximize programming productivity and reliability.

InterBase	YES
ORACLE	NO
SYBASE	NO

High-Flying Airborne Express Keeps Feet On The Ground

BY JULIA KING



Rich Frishman

Airborne's Billings *credits seven years of industry-topping growth to the use of time-tested systems*

Information systems managers seeking answers to the eternal conflict between acquiring the latest technology and keeping costs down can learn a thing or two from David A. Billings.

"We use no technology before its time," says Billings, vice president of information and technology systems at Airborne Freight Corp., more commonly known as Airborne Express.

Rather than buy the hottest technology when it first hits the streets, Billings waits a few years until the price falls. Airborne purchased its second mainframe, an Amdahl Corp. 5990/1400, only last year — a full decade after launching its air express service, for example.

This conservative attitude, combined with careful choices about where and when technology is implemented, makes Airborne the most effective user of IS in transportation.

This conservative attitude, combined with careful choices about where and when technology is implemented, makes Airborne the most effective user of IS in transportation.

The Seattle-based company's careful use of IS has helped deliver first-class financial results. In 1990, Airborne boasted revenue of $1.1 billion, up 24% on $950 million in the previous year. Net earnings were $31 million, 63% over 1989's $19.1 million. During the same period, shipments grew by 33%.

Airborne's IS expenditures kept pace with business growth, climbing from $40.6 million to $52.3 million or nearly 4.5% of revenue — one of the highest ratios in the industry. Moreover, Airborne obtains greater payback from each IS dollar invested now than it did five years ago. In 1985, IS costs per shipment were 85 cents. Currently, they are 44 cents.

These statistics explain Airborne's position as the rising star of the overnight delivery business. In fact, the company has been the fastest growing in the industry for seven years straight. There are still bumps ahead, though.

Airborne faces tough competition from technology-savvy companies such as Federal Express Corp. And while competitors have invested in state-of-the-art technology, Airborne continues to use older technology such as voice radios.

Using electronic data interchange (EDI), Airborne has

PEER RATINGS

Top five companies according to *Premier 100* peer rating

Company	Points
• Federal Express Corp.	9,000
• AMR Corp.	8,955
• Delta Air Lines	8,820
• Union Pacific Corp.	8,610
• Roadway Services, Inc.	8,565

established programs such as Linkage and Libra that allow customers to furnish almost half of all shipment data electronically. Such services have won the company large corporate customers including IBM and Eastman Kodak Co.

EDI is the technological building block on which Airborne's three customer service programs are based. Linkage, the most recent of the three, furnishes a direct connection between high-volume customers' automated shipping systems and Airborne's mainframe.

Airbills, billing information and shipping labels are all produced electronically, eliminating piles of paperwork and hours of manual data input.

A part of the shipment tracking program, Focus, launched in 1988, combines with bar-code scanning technology to give customers real-time access to round-the-clock information about their shipments.

Airborne's third major EDI-based application is its highly successful Libra system. Combined with Focus, Libra automates the way in which shipments are tendered to the carrier.

Consisting of a personal computer, a scale and a printer, Libra electronically weighs freight, calculates rates and prints shipping labels. Airborne offers Libra systems free of charge to shippers with as few as 20 shipments a day.

The carrier owns and operates a fleet of 60 aircraft and leases 100 planes.

2

AMR CORP.

Max D. Hopper, *senior vice president of information systems*

AMR in Fort Worth, Texas, continues to set industry standards, thanks to forays into such areas as expert systems and research into automated customer services. The $11.8 billion parent company of American Airlines made these IS gains despite a turbulent year for airlines. IS spending, however, has been restrained in the past year, so technology must provide bigger payoffs with less money, says Tom Kiernan, president of AMR's Sabre computer services.

For example, AMR rerouted its pricing program, containing 15 million fares, from its Sabre commercial reservation system to another mainframe environment. That move, Kiernan says, allowed AMR to double the amount of its transactions.

AMR has also invested heavily in profit-oriented expert systems, including a load planner that lets the airline schedule more flights without increasing the number of employees.

3

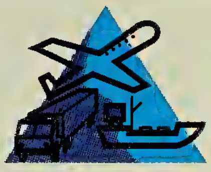
DELTA AIR LINES

Ron Eubanks, *director of information services operations*

Prudent investment in a big-payoff computerized reservation system lifted Delta in the *Premier 100* this year. The $8.6 billion Atlanta-based airline managed a 7% increase in flights this year, while most competitors pared schedules.

The carrier joined forces with Trans World Airlines and Northwest Airlines to create Worldspan, a high-payoff reservation system.

Delta has embarked on two major systems projects, including four mainframe upgrades to run a crew-scheduling application and an on-line maintenance system.



TRANSPORTATION

Response base for all charts:
10 *Premier 100* companies from industry group

SUCCESS FACTORS

1. Teamwork and management support
2. Accessibility of information and networks
3. Understanding business systems and architectures

BIGGEST CHALLENGES

1. Coping with changing economics
2 Meeting the demand for high-quality customer service
3. Competition from other companies

CRITICAL TECHNOLOGIES

1. Local-area networks
2. Imaging systems
3. Expert systems

4

UNION PACIFIC CORP.

John Manning, *director of information services*

A real-time train-tracking system, complete with satellite technology, highlights Union Pacific's IS efforts.

The system is key because 14% of the railroad cars it controls carry highly regulated chemical loads, which account for nearly one-fourth of the profits at the $7 billion, Bethlehem, Pa.-based firm. Protected by a concrete bunker, the system's 500-plus terminals and mainframes help control 700 trains running in 19 states over 21,000 miles of track.

A new work order system continually updates car movements, sending instructions via satellite to terminals on each train. Orders are then updated and real-time confirmations returned by the crews. *Chemical Week Associates* ranked Union Pacific's system ahead of similar efforts by AT&T, General Motors Corp. and others.

5

ALASKA AIR GROUP, INC.

Leif Haslund, *assistant vice president, administrative services*

The $1.1 billion, Seattle-based holding company of Alaska Airlines, which is repeatedly praised for its generous spending on quality meals, free wine and ample seating for passengers, also boasts an IS department that's ready to serve.

In 1990, IS developed and implemented several customer service applications. Among them are an IBM mainframe-based frequent-flier program, an airline scheduling system and a statistical modeling application for ordering the correct number of airline meals.

Such applications are evidence that IS puts end users in the cockpit. "We have many astute user groups in the company," Haslund explains. At Alaska Air Group, which has been profitable for the past 18 years, the job of IS is to help end users get profitable applications off the ground.

⑥

UNIGROUP, INC.

Bill Troutman, *manager of data administration*

A commitment to integrated operating systems has kept Unigroup in Fenton, Mo., moving along profitable and innovative lines. The $783 million primary business is United Van Lines, a moving company for household goods and related activities.

Alan Levenson

Computer-based *tracking systems help keep Union Pacific's schedules from derailing*

While the company, citing security, declines to discuss specifics, it says it is using new software to facilitate communications and shipment processing to become more price-competitive. Unigroup's IS department is also developing business applications systems that will assist the company in re-engineering business processes.

⑦

FEDERAL EXPRESS CORP.

Ron J. Ponder, *senior vice president*

An ongoing commitment to technical excellence and a focus on real-time systems, open systems and systems integration has delivered timely payoffs for Federal Express. Led by technologically savvy Chief Executive Officer Frederick W. Smith, the $7.1 billion company has embarked on a 3½-year project to upgrade its much-admired Cosmos worldwide tracking system to a Unix-based, distributed relational database management system.

Armed with a $234 million IS budget, the Louisville, Ky.-based carrier developed a real-time, menu-driven bar-code scanner. Federal Express also bought an IBM Enterprise System/9000 mainframe to help install the improved routing, sorting and tracking system. This first step in Cosmos II will serve 30,000 courier printers generating "intelligent" machine-readable labels, Ponder says.

⑧

WORLDCORP, INC.

Clarence Johnson, *director of information services*

An investment in a scaled-down, distributed and more user-friendly system is paying off at Worldcorp in Herndon, Va. The $3.2 billion air transportation company is trading in its IBM mainframe system for a Unix-based system that is expected to shave $1.5 million from operating costs during the next five years.

Part of that potential savings rests in easier systems development, with natural language capabilities put in the hands of end users. Unix software will run on 80 Sun Microsystems, Inc. 4/490 workstations, allowing end users to handle routine tasks and freeing the IS staff to concentrate on sales and revenue programs and crew scheduling applications, Johnson says.

⑨

BURLINGTON NORTHERN, INC.

Robert M. Brydges, *assistant vice president of computer operations and IS*

An innovative computerized rail tariffs program has helped Burlington Northern in Fort Worth, Texas, head for a prosperous future.

In an industry struggling for standards, the $4.7 billion railroad giant is one of two rail companies to have responded to the Interstate Commerce Commission's request to publish tariffs in computerized form.

Unlike competitor CSX Transportation, Burlington Northern has its system on-line. A remote bulletin-board system called Acres allows customers of the industrial railroad — shippers of products such as coal, grain and automobiles — to access a continually updated database and register their bids electronically.

⑩

ROADWAY SERVICES, INC.

Jon T. Pavloff, *vice president of corporate planning*

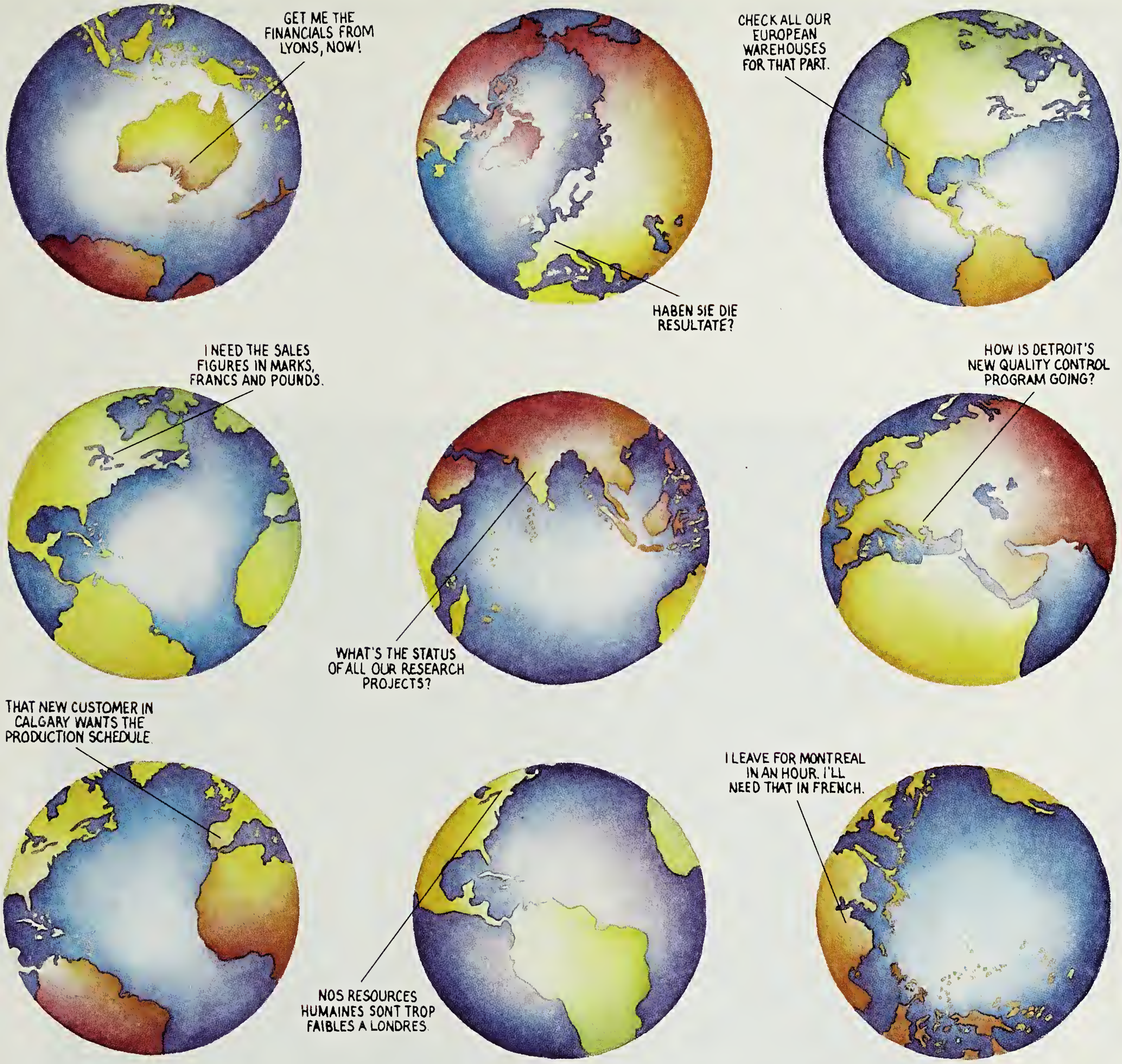
A database network has kept Roadway Services in Akron, Ohio, trucking profitably along. Summit Information Systems, a subsidiary of the $2.97 billion freight and transport services holding company, has assembled a system for tracking 50,000 daily shipments. At its heart is a Model 204 DBMS on an IBM mainframe that is linked to an IBM Systems Application Architecture network.

Precise field locations are bar-coded and scanned from shipping routes, which helps the system track shipments. Customers benefit from Roadway's technology edge by accessing shipment status through personal computers and the company's voice-response system.

The company's technological progress is reflected in financial performance: The Roadway Package System, which delivers packages weighing 100 pounds or less, made its first profit in 1989.

Roadway earned $119.1 million in profits in 1990, a 24.7% increase over 1989. The company invested $80.5 million in IS in 1991.

BRIEFS COMPILED AND WRITTEN BY
JANET MASON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CHECK ALL OUR EUROPEAN WAREHOUSES FOR THAT PART.
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I NEED THE SALES FIGURES IN MARKS, FRANCS AND POUNDS.
HOW IS DETROIT'S NEW QUALITY CONTROL PROGRAM GOING?
WHAT'S THE STATUS OF ALL OUR RESEARCH PROJECTS?
THAT NEW CUSTOMER IN CALGARY WANTS THE PRODUCTION SCHEDULE.
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TAKE ADVANTAGE OF CHANGE℠

Katherine Lambert

MCI will *spend more than $200 million in 1991 developing software for new services, says IS boss Zucco*

MCI: Software Hard Sell

Think the No. 2 long-distance company is just a utility? Think again

BY AMY BERNSTEIN

Everyone knows MCI Communications Corp. is a long-distance telephone company, right? Try telling that to computing executives at MCI's Washington, D.C., headquarters.

They would probably tell you that MCI is actually a $7.6 billion *software* company. In fact, they'd say, every major new product and technology produced by MCI for the near future is based on software, not hardware.

Finally, they'd point out that more than half of MCI's $440 million information systems budget this year will go to developing software for domestic transmission and switching network hardware — from order entry to billing, from 800 service to electronic mail and beyond.

"IS *is* the product, in many senses," says James L. Zucco Jr., MCI's new senior vice president of systems engineering, who replaced Allan Ditchfield earlier this year.

So-called "location level" billing is a case in point. This new service lets large corporate customers design their own phone bills — to the point of accessing MCI billing information through their own office terminals. Again, the product is just a software-created variation of an existing billing system, courtesy of MCI's IS department.

Another example is MCI's new Friends and Family service. What makes the discount-rate service work? Not hard wires between callers but a custom software billing system to accommodate each subscriber.

Competition from AT&T, U.S. Sprint Communications Co., GTE Corp. and others has sparked MCI to make creative use of technology and to ally product development with business and IS groups. That's a good thing because the company's historically strong financial performance suffered this year. Profits in 1990, which totaled $299 million, were down 46.4% from 1989. One reason for the falloff is the considerable sum spent on important software now in the pipeline.

One technology, called Synchronous Optical Network, or Sonet, lets customers select wide or narrow network bandwidth on demand. In practical terms, that means a data center manager in a large company could one day ask MCI to provide a higher than normal level of transmission for just three hours each night, for example, so one mainframe could swiftly download high volumes of data to another mainframe. The firm would pay for excess transmission capacity only as needed.

MCI is the first carrier to pilot Sonet in the U.S. Trials are under way on MCI's 150-mile fiber-optic route between Dallas and Longview, Texas. "We're pushing intelligence down the network" with every new software product the company delivers, Zucco says.

The ultimate test of MCI's increasing reliance on software development, however, may be its new Global Communications Service (GCS). GCS is an aggressive push to win major overseas accounts by providing the same services offered in the U.S. Successful implementation would mean worldwide availability of provisioning, troubleshooting, order entry and billing — all supported through MCI's IS services.

GCS' first customer, Visa International, Inc., says it sees an advantage in having a single point of contact for complete long-distance service for new customers in other countries. Visa will rely on MCI to support its major domestic and international credit-card transaction network, Visanet 2000.

Virtual projects

MCI is also moving ahead with plans to form direct software links between its computers and its customers through a process known as "virtualization."

In MCI-speak, virtualization simply refers to developing telecommunications products and services based on software, not hardware.

By 1995, for example, virtualization would mean replacing dedicated physical T1 networks with high-speed circuit-switching services created in software. Zucco predicts, "In the next couple of years, the need for complex data, with many lines, will disappear as dial-up data becomes a reality [through network virtualization]."

With just 14% of the domestic long-distance telecommunications market, MCI has a long way to go before it overtakes AT&T. But if that day ever arrives, MCI will have banished any doubts that it is a software, networking and IS company.

2

BELL ATLANTIC CORP.

Joseph T. Ambrozy, *vice president, IS*

Two major acquisitions plugged the Philadelphia-based telecommunications giant into new businesses last year while sparking a large-scale IS reconfiguration and consolidation.

In January, Bell Atlantic acquired Control Data Corp.'s third-party maintenance business, creating Bell Atlantic Business Systems Services. In efforts to stay trim, the new subsidiary cut 240 of 3,600 jobs and a layer of management.

Six months later, Bell Atlantic purchased American Management Systems in Arlington, Va. That acquisition sired Bell Atlantic Systems Integration Co. The new unit will concentrate on imaging, integration and interoperability.

However, the biggest IS news was Bell Atlantic's decision to make Unix its preferred operating system. Now, all long-term workstation software and hardware must use pen-based, open systems.

Also under way is a major project to revamp the sales and service systems over a four-year period.

UTILITIES

Response base for all charts:
10 *Premier 100* companies from industry group

SUCCESS FACTORS

1. Teamwork and management support
2. Accessibility of information and networks
3. Understanding business systems and architectures

BIGGEST CHALLENGES

1. Competition from other companies
2. Coping with changing economics
3. Increasing IS productivity and efficiency

CRITICAL TECHNOLOGIES

1. Local-area networks
2. Imaging systems
3. CASE tools

3

AT&T

W. F. Osl Jr., *vice president, information management services*

AT&T had a big year, undertaking a sweeping reorganization and acquiring NCR Corp.

The postmerger communications giant increased IS spending to $2.8 billion, making it the nation's biggest investor in information technology. That sum will be needed to carry out the massive changes and automation that New York-based AT&T said it hopes will improve responsiveness and cut bureaucracy.

AT&T has decentralized applications development, moving 6,500 developers and programmers into its 19 business units. It has also consolidated data centers. As a result, some 1,000 workers from five centers may be eliminated this year.

On a corporate level, the company won a $1.4 billion computer contract from the Internal Revenue Service. In addition, AT&T clinched an agreement with IBM to integrate the two companies' network management systems.

4

AMERITECH CORP.

Glen Arnold, *vice president, information technology*

The gospel of centralization and standardization has reached Ameritech. The Chicago-based firm boosted IS spending to $954 million (up from $880 million), in part to help pull together the systems at its five phone companies.

During the past year, IS devised several corporatewide policies, including guidelines for computer-aided software engineering (CASE) and terminals and standardization on Unix and MVS. Work is also proceeding on a five-year plan to trim processing costs by 20%. The strategy is to consolidate 14 data centers into four.

David Joel/Tony Stone Worldwide

Telecommunications carriers *rely heavily on IS-supported satellite systems*

⑤

GTE CORP.

Joseph Rasmussen, *director, information management services*

GTE's merger with Contel Corp. has kept the IS staff at GTE's Stamford, Conn., headquarters and elsewhere busy planning the consolidation of Contel's five data centers into GTE's four. Company officials say the transition is going smoothly.

One reason is that GTE Data Services just finished a four-year project to consolidate its nine regional data centers into four. Labor and overhead savings from the moves hit $49 million in 1990 and are expected to total $149 million over five years. Other benefits include 25% reduction of data center staff, 87,316 fewer sq ft of space, less duplication of effort and a 51% drop in cost per billable CPU unit.

⑥

SOUTHWESTERN BELL CORP.

Ghyrane A. Davidson, *vice president, IS*

Plans to reorganize and consolidate IS at Southwestern Bell are not just big, they're titanic.

Project Titan, the St. Louis-based company's plan to cut costs and streamline operations, is scheduled to be completed by the year 2000. The goal is to migrate no fewer than 500 corporate computer systems from 22 operating systems to MVS and Unix. Another goal is to implement a "Strategic Systems Architecture," which will divide the company's systems into three specific functional areas: databases, data processing and user access. This year, IS has already chipped in to cut costs by taking a 4% reduction.

PEER RATINGS

Top five companies according to *Premier 100* peer rating

Company	Points
• Bell Atlantic Corp.	8,760
• Carolina Power & Light Co.	8,655
• Southwestern Bell Corp.	8,655
• Ameritech Corp.	8,625
• Northeast Utilities	8,610

⑦

PACIFICORP

Rodney M. Boucher, *chief information officer*

Pacificorp joined the Top 10 in its industry group for the first time this year, thanks to its success in merging the IS departments of Pacific Power and Light with Utah Power and Light.

Other recent IS work at Portland, Ore.-based Pacificorp includes an executive information system and a corporate directive to move to an open systems architecture. IS staff was cut from 400 to fewer than 300, but Pacificorp continues to expand.

⑧

NORTHEAST UTILITIES

Tod O. Dixon, *vice president, information resources*

Revamped internal systems and new technologies have given Northeast Utilities in Hartford, Conn., a bright outlook this year. Among major projects was a $9 million contract with Andersen Consulting for the implementation of new budget/general ledger, payroll and customer information systems. The Hartford utility also joined the ranks of Integrated Services Digital Network users.

⑨

CAROLINA POWER & LIGHT CO.

R. Thomas Dwyer, *vice president, information services*

IS management at Carolina Power & Light in Raleigh, N.C., has focused on four areas over the past year. First is integrated work management practices, including stepping up the use of project management tools and partnering with clients on major projects. Second is getting top performance at low cost. Third is creating a well-defined corporate information technology architecture. Fourth, emphasis continues on extensive client communication, management education and training programs.

⑩

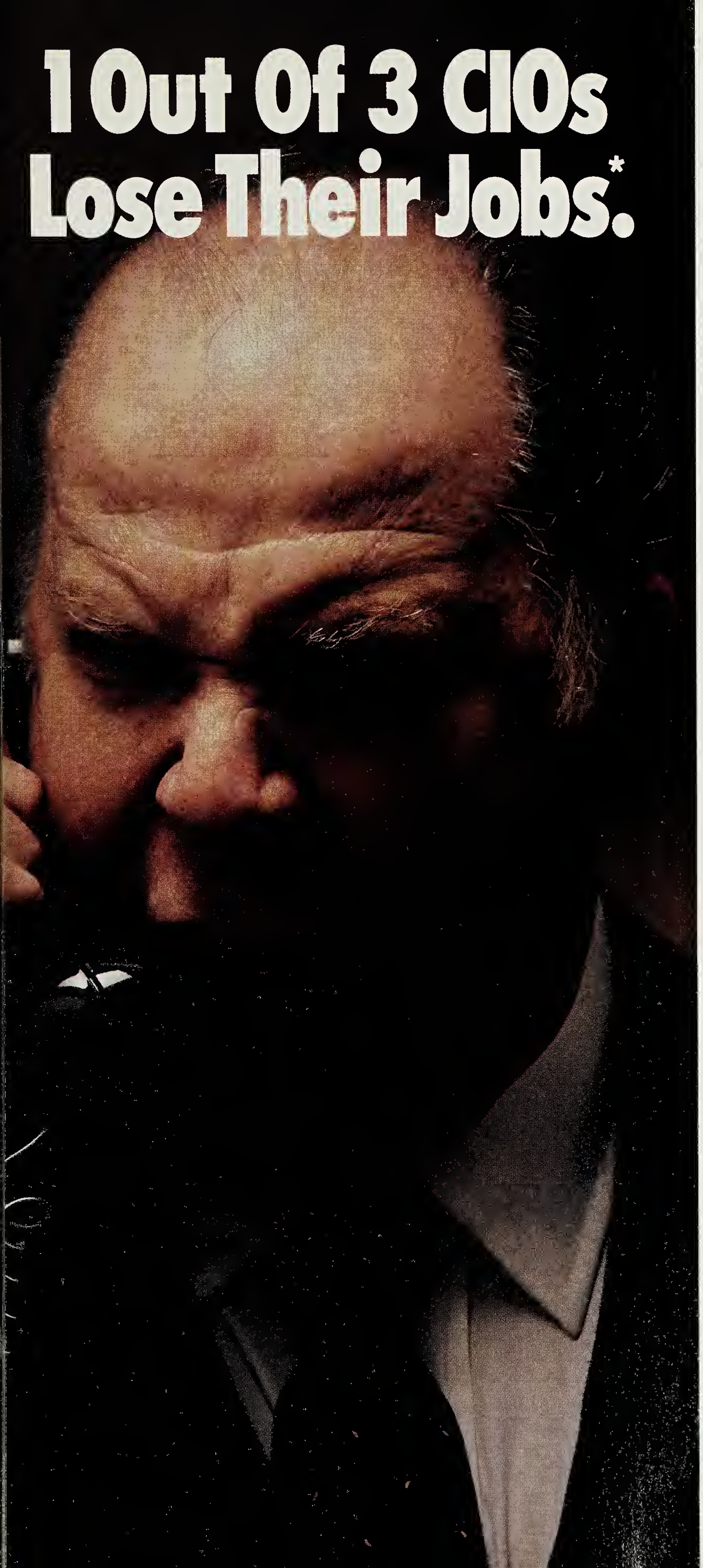
LONG ISLAND LIGHTING CO.

William Dimoulas, *vice president, IS and technology*

Long Island Lighting in Hicksville, N.Y., finally emerged this year from a financial crisis linked with construction of the Shoreham nuclear power plant. After years of stagnant growth, IS hands were untied.

They quickly devised a plan to use CASE tools, moved to a relational database environment, upgraded company mainframes, implemented a $7 million Digital Equipment Corp. VAX-based office automation strategy and outlined 12 major systems initiatives. Topping the project list is the integration of procurement with accounts payable and stores. The next priority is to set up a system to handle overdue accounts. The IS department also kicked off a $1 million research project.

BRIEFS COMPILED AND WRITTEN BY
EMILY LEINFUSS



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- Were they overwhelmed by the issues?

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*Source: *Computerworld* article, February 1991

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The Last Word

By Michael Hammer

Some of you may be wondering how you can become a member of the august pantheon known as the *Computerworld Premier 100.* Let me save you some heartbreak by assuring you that a brute force approach won't get you anywhere. It should be obvious by now that in the area of IS spending, more is often much, much less.

Moreover, being a user of leading-edge technology is not the same as being a leading-edge user of technology. Using advanced technology *per se* is not what distinguishes *Premier 100* firms; it is the wise selection and use of advanced technology that gets companies on the list.

Nor will "strategic systems" be your ticket to fame. We should have all learned by now that systems alone do not confer "competitive advantage." Any such advantage is achieved only by having the right business strategy, by excellent execution of key processes and by ensuring that all aspects of the organization are designed with these processes in mind. Systems play a strictly ancillary role in this endeavor. It is not the systems that make the difference but the purposes *for* which and the methods *by* which they are deployed.

What then makes some organizations more effective users than others? The findings of PRISM, a joint research service of my company and CSC/Index Corp., indicate the following key qualities of leading IS users:

- IS groups at such firms work as partners with their business counterparts. This goes beyond treating users as clients. IS and users work as equals with a common goal: the success of business initiatives.
- These groups establish system architectures that guide their decision-making in the face of change. They follow guidelines that prevent inconsistencies and adopt a policy of revitalizing the installed base.
- They treat their systems as assets. These firms see their systems as one of their key capabilities, which help to define their markets and their strategies.

Steven Lewis

But here comes the tricky part. It turns out that simply knowing these issues are critical does not mean you will be able to do much about them. Many organizations recognize that these issues are the key to success, but they seem unable to act on that recognition to accomplish these goals. Why? The best answer is that the real difference between leading companies and also-rans lies not in what they *do*, but in what they *are*.

Some organizations, by their nature, have what it takes to perform these functions, while others do not. Everyone knows what to do, but only some possess the values and attitudes that enable them to actually do it. Simply trying harder to develop architectures or build partnerships with your users is futile unless you have the "right stuff" — and if you have it, then success will come naturally.

Most fundamentally, the capacity to be an effective user of IS is grounded in an organization's belief system. If it is widely believed that information technology is important to the success of the enterprise, then a high value will be placed on systems and systems people. If IS personnel believe that they are not in the technology business but in the same business as their users, then they will naturally form cooperative partnerships with the users. If people throughout the company believe that their success depends on the success of the enterprise as a whole then they will adhere to architectural guidelines, not resent them. The company's belief system creates an environment in which a winning approach to technology management will flourish.

How do you inculcate such values in an organization? The answer is simple: It is done through the exercise of leadership by both IS executives and the firm's senior managers. Through their personal behavior, through messages they communicate to the organization and, most importantly, through the management systems of measurement and compensation that they implement, executives send strong signals as to what is really important and what is not. If an organization's management consciously creates the right value system, the right behavior and the right results will follow.

We have managed to reduce the original issue — how to be an effective user of IS — to another one: how to create the right value system in your organization. If you have the feeling that the latter goal is not much easier to accomplish than the orginal one, you may be right.

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IDC Study on UNIX OLTP

UNIX On-Line Transaction Processing at Multi-User UNIX Sites (January 1991) states that some 47.4% of sites running commercial applications on multi-user UNIX systems are running OLTP. The study reports that Informix is in use at more sites than any other DBMS for UNIX OLTP applications.

About the TPC

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